The Royal Aeronautical Society

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PROCEEDINGS

TWENTIETH WILBUR WRIGHT MEMORIAL LECTURE AND CONVERSAZIONE

The Twentieth Wilbur Wright Memorial Lecture was delivered in the Aeronautical Section of the Science Museum, South Kensington, on Thursday, May 26th, 1932, before a distinguished company of members and guests. The lecture, by Mr. H. E. Wimperis, C.B.E., M.A., Fellow and Vice-President of the Society, was on "Some New Methods of Research in Aeronautics." The chair was taken by Mr. C. R. Fairey, M.B.E., F.R.Ae.S., President of the Society. The function was held at the Science Museum by kind permission of the Director, Colonel Sir Henry Lyons, Hon.D.Sc., F.R.S.

The lecture was preceded by the Council Dinner at which the following were present:—

Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President), in the chair.
The Master of Sempill, A.F.C., F.R.Ae.S. (Immediate Past-President).

GUESTS.

Mr. H. E. Wimperis, C.B.E., M.A., F.R.Ae.S. (Vice-President).
Miss Amelia Earhart (Mrs. G. P. Putnam), the first lady guest ever invited to the Council Dinner.
The Most Honourable the Marquess of Londonderry, K.G., M.V.O., Secretary of State for Air.
Air Vice-Marshal H. C. T. Dowding, C.B., C.M.G., Air Member for Supply and Research.
Sir Richard T. Glazebrook, K.C.B., F.R.S., F.R.Ae.S., Chairman of the Aeronautical Research Committee.
Sir Joseph E. Petavel, K.B.E., D.Sc., F.R.S., F.R.Ae.S., Director of the National Physical Laboratory.
Mr. H. T. Tizard, C.B., A.F.C., F.R.S., F.R.Ae.S., Rector of the Imperial College of Science and Technology.
The Right Hon. Lord Gorell, C.B.E., M.C., M.A., Chairman of the Royal Aero Club.
Sir J. D. Siddeley, C.B.E., F.R.Ae.S., Chairman of the Society of British Aircraft Constructors.
Lieut.-Colonel M. O'Gorman, C.B., D.Sc., M.Inst.C.E., F.R.Ae.S., Vice-President, Fédération Aéronautique Internationale.
Colonel Sir Henry Lyons, Hon.D.Sc., F.R.S.
Captain H. C. Rawlings, D.S.O., R.N., Air Officer Commanding the Fleet Air Arm.
Mr. F. W. Lanchester, LL.D., F.R.S., M.Inst.C.E., Hon.F.R.Ae.S.
Mr. Arthur J. Barratt, K.C., Counsellor to the American Embassy.
Major F. M. Scanlon, American Military Attaché for Air.
Colonel H. Nerincx, Belgian Military Attaché.
Captain M. J. B. Davy, A.F.R.Ae.S.
Major B. F. S. Baden-Powell, F.R.A.S., F.R.Met.Soc., Hon.F.R.Ae.S.

VICE-PRESIDENTS.

Lieut.-Colonel J. T. C. Moore-Brabazon, M.C., M.P., F.R.Ae.S., M.I.Ae.E.
Professor L. Bairstow, C.B.E., F.R.S., F.R.Ae.S., Zarahoff Professor of Aeronautics, London University.
Mr. Griffith Brewer, F.R.Ae.S.

COUNCIL.

Major T. M. Barlow, M.Sc.(Eng.), M.Inst.C.E., M.I.Mech.E., F.R.Ae.S.
Mr. Robert Blackburn, O.B.E., F.R.Ae.S., M.I.Ae.E.
Air Marshal Sir H. R. M. Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., F.R.Ae.S.
Major G. P. Bulman, O.B.E., F.R.Ae.S.
Mr. R. S. Capon, O.B.E., B.A., F.R.Ae.S.
Mr. E. C. Gordon England, F.R.Ae.S.
Mr. W. S. Farren, M.B.E., F.R.Ae.S., M.I.Ae.E.
Mr. A. H. Hall, C.B.E., M.Inst.C.E., M.I.Mech.E., F.R.Ae.S.
Mr. J. E. Hodgson, Comp.R.Ae.S.I. (Hon. Librarian).
Major D. H. Kennedy, O.B.E., F.R.Ae.S. (Hon. Treasurer).
Mr. M. Langley, A.M.I.Ae.E., Assoc.M.Inst.N.A.
Mr. W. O. Manning, F.R.Ae.S.
Mr. R. K. Pierson, M.B.E., B.Sc., Assoc.M.Inst.C.E., F.R.Ae.S.
Mr. D. R. Pye, M.A., F.R.Ae.S.
Mr. A. F. Sidgreaves, O.B.E., Comp.R.Ae.S.I.
Mr. Lawrence A. Wingfield, M.C., D.F.C., A.R.Ae.S.I. (Hon. Solicitor).
Captain J. Laurence Pritchard, Hon.F.R.Ae.S. (Secretary).

Before the reading of the Wilbur Wright Memorial Lecture the President referred to the honour conferred upon the Society by the presence of Lord Londonderry, the Secretary of State for Air, and Miss Amelia Earhart, who had so recently made the first solo Trans-Atlantic flight by a woman.

Immediately following the reading of the lecture the Society held a Conversazione in the Science Museum, a very large number of the Society's members and friends, and many distinguished guests, being present. During the evening, by kind permission of the Commandant and Officers, R.M., the band of H.M. Royal Marines (Chatham Division) played selections, conducted by Captain P. G. S. O'Donnell, M.V.O., Mus.B.(Oxon), L.R.A.E. A full list of those who attended the Conversazione and the lecture is published below.

The following letter was received from the Secretary of State for Air:—

> Dear Mr. Fairey,—I write to thank you and the Council of the Royal Aeronautical Society for a most enjoyable evening last night. I was very pleased to have such an agreeable occasion for meeting the members of the Council, and Mr. Wimperis's lecture was most interesting.—Yours sincerely, LONDONDERRY.

Among those present at the Conversazione and the Lecture were the following, in addition to those present at the Council dinner:—

Patrick Alexander, Esq., Hon.F.R.Ae.S., Wing Comdr. D. L. Allen, A.F.C., Mrs. Allen, A. L. Aldridge, Esq., Mrs. Aldridge, F. Andreae, Esq., S. T. G. Andrews, Esq., B.Sc.(Eng.), M.I.Ae.E., Mrs. Andrews, G. N. Ashcroft, Esq., Stud.R.Ae.S.I., J. R. Ashwell-Cooke, Esq., Comp.R.Ae.S.I.

The Hon. Lady Bailey, D.B.E., A.R.Ae.S.I., Major C. J. Ball, D.S.O., M.C., A.F.R.Ae.S., F. Rodwell Banks, Esq., O.B.E., A.F.R.Ae.S., Captain A. J. Barlow (Secretary, Air League of the British Empire), Captain F. S. Barnwell, O.B.E., A.F.C., F.R.Ae.S., F. S. Barton, Esq., M.A., F.Inst.P., B.Sc., Mrs. Barton, H. Bateman, Esq., A.C.G.I., B.Sc., D.I.C., A.F.R.Ae.S.,

Dr. Philippe Bauwens, G. E. Beharrell, Esq., Mrs. Blanco-White, H. Boden, Esq., W. A. R. Bourne, Esq., Mrs. Bourne, Captain C. E. Bowden, R.A.S.C., Mrs. Bowden, H. P. Bowler, Esq., F. D. Bradbrooke, Esq., Mrs. Bradbrooke, W. Broadbent, Esq., Lady Brooke-Popham, R. M. Brutnell, Esq., L. C. Bygrave, Esq., M.B.E., A.M.I.E.E., F.R.Ae.S.

Mrs. Capon, Major B. C. Carter, F.R.Ae.S., Mrs. Carter, R. L. Carter, Esq., A.R.Ae.S.I., Wing Comdr. T. R. Cave-Browne-Cave, C.B.E., M.I.Mech.E., F.R.Ae.S., L. E. Caygill, Esq., Air Commodore, J. A. Chamier, C.B., C.M.G., D.S.O., O.B.E., A.F.R.Ae.S., Mrs. Chamier, C. R. Charles, Esq., Dr. H. Chatley, M.Inst.C.E., A.F.R.Ae.S., Mrs. Chatley, Miss L. Chitty, A.F.R.Ae.S., T. W. K. Clarke, Esq., B.A., Assoc.M.Inst.C.E., F.R.Ae.S., Mrs. Clarke, W. T. Clarke, Esq., Mrs. W. T. Clarke, Miss Alice Clarke, Miss Margaret Clarke, Victor Cofman, Esq., D.Sc., Science Service of America, W. S. Coleman, Esq., Stud.R.Ae.S.I., A. R. Collar, Esq., Lieut.-Comdr. C. N. Colson, A.R.Ae.S.I., R.N. (Rtd.), Miss Colson, H. Constant, Esq., M.A., A.F.R.Ae.S., Major S. Cotton, Miss G. Cottrell, Comp.R.Ae.S.I.

Sir Henry Dale, C.B.E. (Secretary of the Royal Society), R. H. Dale, Esq., R. W. Dana, Esq., O.B.E. (Secretary of the Institution of Naval Architects), Squadron Leader C. J. W. Darwin, D.S.O., F. A. Davies, Esq., Mrs. Davies, Henry Davies, Esq., B.A., A.F.R.Ae.S., Mrs. D. Davies, Mrs. M. J. B. Davy, C. L. Day, Esq. (United Press of America), Flight Lieut. L. A. W. Deane, Mrs. Digby, G. P. Douglas, Esq., M.C., D.Sc., A.F.R.Ae.S., Mrs. Douglas, Mrs. Dreschfield.

E. J. Earle, Esq., A.F.R.Ae.S., Mrs. Gordon England.

Captain A. B. Fanstone, M.A., A.F.C., A.F.R.Ae.S., Lieut.-Colonel L. F. R. Fell, D.S.O., O.B.E., F.R.Ae.S., Mrs. M. D. M. Fell, N. A. Ferguson, Esq., A.M.I.Ae.E., Mrs. Ferguson, C. Ferraro, Esq., Mrs. Figgures, H. R. Fisher, Esq., Dr. A. H. Fleming, Captain A. G. Forsyth, E. Forsyth, Esq., Miss Forsyth, Mrs. J. D. Fullerton, Founder Member, R.Ae.S.I.

Lieut. C. M. Gadda, A.F.R.Ae.S., Dr. F. H. Garner, H. M. Garner, Esq., M.A., F.R.Ae.S., I. J. Gerard, Esq., M.Sc., A.F.R.Ae.S., E. C. Gibbons, Esq., A.F.R.Ae.S., Mrs. Gibbons, Miss Giles, Air Commodore N. J. Gill, C.B.E., M.C., A.F.R.Ae.S., R.A.F., H. R. Gillman, Esq., A.F.R.Ae.S. (Secretary, Society of British Aircraft Constructors, Ltd.), Mrs. Gillman, H. Glauert, Esq., M.A., F.R.S., F.R.Ae.S., Mrs. Glauert, Squadron Leader R. V. Goddard, Miss Goodyear, B.Sc., Lady Gorell, Major F. M. Green, O.B.E., F.R.Ae.S., Mrs. Green, H. S. Green, Esq., M.I.A.E., M.I.Ae.E., F. W. G. Greener, Esq., C. G. Grey, Esq. (Editor, *The Aeroplane*), W. H. Grieve, Esq.

The Hon. M. U. Hachisuka, Squadron Leader R. A. De Haga Haig, A.F.C., A.F.R.Ae.S., Mrs. A. H. Hall, F. W. Halliwell, Esq., A.M.I.A.E., A.F.R.Ae.S., Mrs. Halliwell, A. Hallman, Esq. (Associated Press of America), M. C. C. Haycraft, Esq., Stud.R.Ae.S.I., J. Courtney Haydon, Esq., Mrs. Courtney Haydon, Miss M. V. Hayes, R. M. Hayes, Esq., Comp.R.Ae.S.I., J. M. Heesem, Esq., A.F.R.Ae.S., Mrs. Heesem, H. Hemming, Esq., A.F.C., A.F.R.Ae.S., Mrs. Hemming, Captain G. T. R. Hill, M.C., M.Sc., F.R.Ae.S., Mrs. Hill, Wing Comdr. R. M. Hill, M.C., A.F.C., F.R.Ae.S., Mrs. Hill, L. E. Hoddle, Esq., Stud.R.Ae.S.I., Miss E. Homan, E. J. Horne, Esq., H. L. Horning, Esq., Mrs. Horning, J. L. Hutchinson, Esq., B.A., A.F.R.Ae.S.

G. R. Irvine, Esq., H. B. Irving, Esq., B.Sc., F.R.Ae.S.

A. C. M. Jackaman, Esq., A.M.I.Ae.E., A. N. Jackaman, Esq., Thurstan James, Esq., Miss F. Jarvis, Miss Arnrid Johnston, E. T. Jones, Esq., B.Eng.

J. Kewley, Esq., M.A.(Cantab.), M.I.Chem.E., F.I.C. (President of the Institution of Petroleum Technologists), Mrs. Kewley, F. R. B. King, Esq., Stud.R.Ae.S.I.

Dr. G. V. Lachmann, A.F.R.Ae.S., Captain A. G. Lamplugh, A.C.G.I., F.R.Ae.S., M.I.Ae.E., Mrs. Lamplugh, Dr. H. R. Lang (Secretary, Institute of Physics), Miss Lang, Mrs. M. Langley, R. Langley, Esq., C. W. Lawson, Esq., Stud.R.Ae.S.I., Miss M. Lawson, M. Lewin, Esq., A.F.R.Ae.S., Mrs. Lewin, Miss Norma Lewis, Captain A. G. Lingham, D.F.C., A.M.I.Ae.E., G. A. Little, Esq., C. N. H. Lock, Esq., M.A., F.R.Ae.S., Mrs. Lock, J. C. Longman, Esq., Stud.R.Ae.S.I., G. Lyon, Esq., M.Sc., A.F.R.Ae.S., Lady Lyons, Miss M. Lyons.

— Macauley, Esq. (*New York Times*), J. W. Maccoll, Esq., B.Sc., Ph.D., A.F.R.Ae.S., Flight Lieut. A. W. B. McDonald, Mrs. McDonald, Captain N. Macmillan, M.C., A.F.C., A.F.R.Ae.S., J. A. MacMullen, Esq., M.B.E., E. L. Mann, Esq., Lieut.-Colonel W. Lockwood Marsh, O.B.E., M.A., LL.B., F.R.Ae.S., Miss Mathews, Colonel J. S. Matthew, C.M.G., D.S.O., Major R. H. Mayo, O.B.E., F.R.Ae.S., Mrs. Mayo, F. Meadows, Esq., A.F.R.Ae.S., Captain G. F. Meager, A.F.C., A. G. M. Michell, Esq., D. N. Milestone, Esq., C. A. Miller, Esq., Mrs. L. M. Moore, H. H. Morris, Esq., Comp.R.Ae.S.I., Mrs. Morris, F. J. Murdoch, Esq., Comp.R.Ae.S.I.

J. L. Nayler, Esq., M.A., F.R.Ae.S., C. H. Latimer Needham, Esq., M.Sc., F.R.Ae.S., Miss Needham, Captain D. Nicolson, M.Inst.N.A., A.F.R.Ae.S., Mrs. Nicolson, Squadron Leader H. St. V. Norman, B.A., A.F.R.Ae.S., Mrs. Norman.

Mons. V. Ojanson (Secretary, Estonian Legation), Madame Ojanson.

F. Handley Page, Esq., C.B.E., F.R.Ae.S., Mrs. Handley Page, Flight Lieut. L. T. Pankhurst, A.M.I.Ae.E., R.A.F., Wing Comdr. R. G. Parry, D.S.O., A.F.R.Ae.S., J. H. Payne, Esq., Stud.R.Ae.S.I., L. H. B. Pemberton, Esq., A.R.Ae.S.I., Major R. E. Penny, O.B.E., A.F.R.Ae.S., Mrs. Penny, H. E. Perrin, Esq., Mrs. Perrin, Hugh Phillips-Smith, Esq., N. A. V. Piercy, Esq., D.Sc., F.R.Ae.S., Mrs. Piercy, Ernest Pitman, Esq., Founder Member, R.Ae.S.I., M. A. Pitts, Esq., W. Pitts, Esq., E. H. Pledger, Esq., Representative of the Press Association, Flight Lieut. R. C. Preston, A.F.C., A.R.Ae.S.I., Mrs. Preston, D. Price, Esq., Stud.R.Ae.S.I., Wing Comdr. H. M. Probyn, D.S.O., Comp.R.Ae.S.I., the Rev. H. W. Pyddoke, Mrs. Pyddoke.

Mrs. H. Rawlinson, Miss B. Rawlinson, E. S. Rayner, Esq., M.I.E.E., P. H. Rayner, Esq., S. C. Redshaw, Esq., M.Sc., A.F.R.Ae.S., E. F. Relf, Esq., A.R.C.S., F.R.Ae.S., L. G. S. Reynolds, Esq., O.B.E., Comp.R.Ae.S.I., Mrs. Reynolds, G. Tilghman Richards, Esq., F.R.Ae.S., M.I.Ae.E., A. P. Rowe, Esq., A.F.R.Ae.S.

Lieut. de Vaisseau A. Sala (French Air Attaché), Major J. C. Savage, M.B.E., M.I.Ae.E., Mrs. Savage, J. Saycatch, Esq., A.M.I.Mech.E., M.I.Ae.E., E. Sayers, Esq., Herr A. H. Van Scherpenberg (Secretary of the German Embassy), Frau Van Scherperberg, G. Shaw Scott, Esq., M.Sc. (Secretary of the Institute of Metals), S. Scott-Hall, Esq., M.Sc., D.I.C., A.F.R.Ae.S., Mrs. Shelmerdine, B. S. Shenstone, Esq., A.F.R.Ae.S., E. Colston Shepherd, Esq., Lady Siddeley, G. J. Smith-Pert, Esq., A. M. H. Solomon, Esq., Harold Solomon, Esq., Lieut. Comdr. the Hon. J. M. Southwell, A.F.R.Ae.S., R.N., Professor R. V. Southwell, M.A., F.R.S., F.R.Ae.S., Mrs. R. V. Southwell, Mrs. Southwell, Sen., Wing Commander J. Sowrey, A.F.C., M.I.Ae.E., R.A.F., T. Stanhope Sprigg, Esq. (Editor, *Air and Airways*), Mrs. Stanhope Sprigg, H. B. Squire, Esq., Flight Lieut. C. S. Staniland, A.R.Ae.S.I., Mrs. Staniland,

A. V. Stephens, Esq., B.A., P. T. Stephens, Esq., W. S. Stephenson, Esq., H. L. Stevens, Esq., B.A., F.R.Ae.S., Mrs. H. L. Stevens, Major C. J. Stewart, O.B.E., M.I.Mech.E., F.R.Ae.S., Mrs. Stewart, Miss B. Stringer, — Stuart, Esq., Captain J. Summers, Captain A. Swan, B.Sc., A.M.Inst.C.E., A.F.R.Ae.S., Mrs. Swan.

Captain S. Takasu (Japanese Naval Attaché), F. A. Thomas, Esq., M.Inst.Met., A.M.I.A.E., A.M.I.Ae.E., P./O. F. O. Thornton, Oliver Thornycroft, Esq., O.B.E., A.F.R.Ae.S., A. P. Thurston, Esq., M.B.E., D.Sc., F.R.Ae.S., M.I.Ae.E., J. D. Titler, Esq., Mrs. Titler, Miss M. Todd, W. A. Tookey, Esq., M.Inst.C.E., M.I.Mech.E., M.I.A.E. (President of the Institution of Automobile Engineers), Mrs. Tookey, H. C. H. Townend, Esq., B.Sc., A.F.R.Ae.S., Mrs. Townend, B. W. Townshend, Esq., A.C.G.I., A.M.I.Mech.E., A.F.R.Ae.S., S. J. Troughton, Esq., Major C. C. Turner, A.F.R.Ae.S., T. H. Turner, Esq., M.Sc., A.R.Ae.S.I., Mrs. F. Tymms, F./O. G. P. Tzannetakis.

Sir A. Verdon-Roe, O.B.E., F.R.Ae.S., M.I.Ae.E., Miss Avis Verdon-Roe, G. A. Vigil, Esq., Stud.R.Ae.S.I., Miss B. Voyce.

Sir Gilbert T. Walker, C.S.I., F.R.A.S., Sc.D., F.R.S., Ph.D., P. B. Walker, Esq., M.A., Ph.D., A.F.R.Ae.S., Flight Lieut. R. C. Wansborough, J. L. R. Waplington, Esq. (Secretary of the British Gliding Association), Mrs. Waplington, Captain C. E. Ward, J. L. Watkins, Esq., Stud.R.Ae.S.I., H. C. Watts, Esq., M.B.E., D.Sc., F.R.Ae.S., Mrs. Watts, Linton Wells, Esq., International News Service of America, Sir Henry White-Smith, C.B.E., Comp.R.Ae.S.I., Lady White-Smith, E. Wieser, Esq., B.Sc., D.I.C., A.F.R.Ae.S., Captain G. S. Wilkinson, F.R.Ae.S., M.I.Mech.E., Mrs. Wilkinson, D. H. Williams, Esq., B.Sc., A.F.R.Ae.S., D. L. Hollis Williams, Esq., B.Sc., A.F.R.Ae.S., Mrs. Hollis Williams, H. A. Wills, Esq., Comp.R.Ae.S.I., Mrs. H. E. Wimperis, Miss B. Wimperis, Miss E. Wimperis, G. Arthur Wingfield, Esq., Mrs. G. Arthur Wingfield, Mrs. Lawrence Wingfield, Captain C. Winter, H. T. Winter, Esq., Founder Member, R.Ae.S.I., W. M. Witchell, Esq., B.Sc., F.R.A.S. (Secretary of the Royal Meteorological Society), Miss F. M. Wood, M.A., Comp.R.Ae.S.I., A. E. Woodward-Nutt, Esq., B.A., A.F.R.Ae.S., Mrs. Woodward-Nutt, Miss M. Wykes.

The PRESIDENT: Before he introduced the reader of the twentieth Wilbur Wright Memorial Lecture it was his pleasant duty to announce a special award to one of the real pioneers of British aviation, Mr. T. W. K. Clarke. Mr. Clarke was, he believed, the first man in this country to start an aeronautical company away back in the aeronautical mists of 1906. A trained and qualified engineer he had, even in those early days, the ability to see that aviation was going to be the greatest power for both peace and war the world has ever known, that by it the fundamental relationships between the peoples of the world would be changed.

Mr. Clarke joined the Royal Aircraft Establishment in 1912 and is still a member of it. He had served on the Council of the Royal Aeronautical Society and was the author of many scientific papers. The Council had specially revived as, he was afraid, a long overdue recognition of Mr. Clarke's work, the Bronze Medal of the Society, a medal which has only been awarded on three previous occasions, in 1909 to Mr. W. R. Turnbull and in the same year to Dr. Lanchester and in the following year to Mr. B. G. Cooper, a former Secretary of the Society.

Before inviting Mr. H. E. Wimperis, Director of Scientific Research at the Air Ministry and a Vice-President of the Society to deliver the twentieth Wilbur Wright Memorial Lecture, he would like briefly to remind them that the lecture was founded in 1913 to perpetuate the memory of Wilbur Wright who, with his brother Orville, were the first to construct and fly a controlled power-driven

heavier-than-air machine on December 17th, 1903. The Science Museum had the great honour of housing the historic aeroplane upon which this flight was made.

The names of those who have read the Wilbur Wright Memorial Lecture number among them the most distinguished ones of the air. The first lecture was delivered by Sir Horace Darwin, and subsequent lecturers included Sir Richard Glazebrook, the Chairman of the Aeronautical Research Committee from its inception; Professor Bryan, whose mathematical analysis of the problem of stability would be for all time a monument to his memory; Professor Bairstow, the Zarahoff Professor of Aeronautics at the Imperial College; Dr. Lanchester, the pioneer of the circulation theory, who put forward his ideas as long ago as 1897, before any aeroplane had flown; Professor Prandtl, who so brilliantly seized upon the seed Lanchester had sown and grafted upon the vigorous plant growths upon which the very foundations of aeronautical theory now rest; and Mr. Handley Page, to whom they owed those safety devices which have made the aeroplane so easy to control and secure to fly.

The Royal Aeronautical Society is justly proud of the fact that it is not only the oldest aeronautical society in the world, but that in its proceedings, recording those who have read papers before it, appear the names of all who are or have been leaders in aviation. And its membership has always included those who have made aviation what it is to-day. He could only mention a few, Stringfellow and Henson, Wenham, Moy, Lilienthal, Pilcher, Lawrence Hargrave, Lord Rayleigh, Sir William Crooks, Sir W. Napier Shaw, Sir George Greenhill, S. F. Cody and Jose Weiss. Of present-day leading figures in aviation all belong to the Society.

The Society had lived through a period of great discouragement, but was now witnessing a period of engineering development the pace of which was too rapid for any man to foresee clearly the end. To keep pace with the swift progress in aviation the Society must progress as well. In the early years of the Society an income of a few hundred pounds a year sufficed for its modest needs. To-day its work is such that to carry it out efficiently the necessary income must be greatly increased. The time had come, too, when the Society should have its own building, fitting to its importance in world aviation, which would be the Mecca of technicians from all over the world. He appealed to all on this important occasion to bear this financial factor in mind. A healthy membership meant a flourishing Society, but the Society must have a reserve so that it can carry out work which is urgently waiting to be done. For that reason the Council had initiated an Endowment Fund to form the basis of such a reserve. They were passing through a world financial crisis, but he earnestly appealed to all to consider the objects they had at heart.

The Society had always maintained a high standard for its lectures throughout its existence. The Wilbur Wright lecturer was chosen with the greatest care, for his eminence in aviation and for his knowledge of his subject. This year in Mr. H. E. Wimperis the Council had, he thought, chosen a lecturer who not only satisfied those two conditions in the highest degree, but one who brought to his subject a charm of delivery equalled by few. He had for many years been a member of the Aeronautical Research Committee and Director of Scientific Research at the Air Ministry and had been, therefore, in an exceptionally favourable position to give an account of those many new and remarkable methods of research which had been developed in recent years. He has had the courage of the pioneer in that he has not hesitated to recommend developments when such developments have not appeared at the time to hold out great prospects. He was receptive to a high degree to new ideas and much of the great progress which had been made in aeronautical research at the Air Ministry was due to its Director of Scientific Research. If he might be unscientific for a moment and use an unscientific phrase, he was the right man in the right job.

Miss AMELIA EARHART: It was a very great privilege to be present on this occasion. It meant a great deal to her, having come from the United States, where she was familiar with the engineering societies, to find something similar here. She felt very much at home, and was glad to know that there was so close an understanding between people who were working for the same objects in both their countries. Her Atlantic flight meant nothing unless it were a justification of the struggles which were made before the aeroplane built and flown by the Wright brothers, and beneath which this meeting was held, had started all their aviation activities.

Speaking of that machine, and bearing in mind that there were many women present, it was fitting to point out that Katharine Wright had had a great deal to do with the experiments her brothers had made and had helped them to manufacture the plane; they had always paid tribute to her work whenever praise was accorded them.

The Royal Aeronautical Society was well known in the United States. The people of America honoured it and knew its work, and she expressed the hope that when any of its members visited the United States they would find that that country had something to offer them.

Mr. H. E. WIMPERIS, before delivering his lecture, said it was a great honour to lecture before the Society and its distinguished guests, particularly as the guests included Miss Earhart, the first woman to make a solo flight across the Atlantic. For that flight he had the most profound admiration. Miss Earhart's only companion during the flight was her aeroplane, the "Vega," named after a brilliant star. He thought of her and her aeroplane as two stars of the first magnitude travelling in company; though there had been other cases of double stars of great brilliance, he believed this was the first occasion on which one had been observed to rise in the West and pursue an Easterly course through the heavens.

NEW METHODS OF RESEARCH IN AERONAUTICS

BY

H. E. WIMPERIS, C.B.E., M.A., F.R.Ae.S.

Director of Scientific Research and Vice-President, Royal Aeronautical Society

It is twenty years ago almost to the day since the world was saddened by the news of the death of one of its heroes—Wilbur Wright. The inspiring story of the successful attack made by the two brothers, Wilbur and Orville, on the age-long problem of human flight is too well known to be told at length here. But it is remarkable that the first flight by a motor driven aircraft on 17th December, 1903,* was made only two years after Chanute, in a speech before the Western Society of Engineers, had felt compelled to use such cautious words as: "There is some hope that, for some limited purposes at least, man will eventually be able to fly through the air." Chanute made that speech when introducing a lecturer none other than Wilbur Wright himself. One wonders what the lecturer thought. What he said is on record and I quote a passage which tells us what it was that turned his and his brother's attention to the problem of flight: "My own active interest in aeronautical problems dates back to the death of Lilienthal in 1896. The brief notice of his death which appeared

* For information on the early work of the Wrights I am indebted to Mr. Griffith Brewer's Wilbur Wright Lecture of 1916.

in the telegraphic news at that time aroused a passive interest which had existed from my childhood, and led me to take down from the shelves of our home library a book on 'Animal Mechanism,' by Professor Marey, which I had already read several times. From this I was led to read more modern works, and as my brother soon became equally interested with myself, we soon passed from the reading to the thinking, and finally to the working stage."

The Wrights' methods were scientific: their tools may have been primitive but their methods were sound. They "made thousands of tests with models of various forms of curved planes in a wind tunnel, and tabulated thousands of readings." How different from some of the impetuous inventors of to-day!

The tunnel they used was but 16 inches square and 6 feet long, a great contrast with the equipment of to-day—31 years later. But despite its tiny size it fulfilled the needs it was created to serve.

The first of the Wilbur Wright Memorial Lectures was given by Sir Horace Darwin, a member of the great Darwin family, and a distinguished worker on the Advisory Committee for Aeronautics. His lecture was on "Scientific Instruments, their design and use in aeronautics," and I well remember reading it again and again. Later I grew to know him well and was able to share his enthusiastic study of the scientific design of instruments.

Nine years have passed since a Wilbur Wright lecturer dealt with the subject of aeronautical research; the lecturer of that day was Dr. J. S. Ames, the Chairman then as now of the National Advisory Committee for Aeronautics of the United States, and the President of Johns Hopkins University in Baltimore. In the world of aeronautics nine years is a long time, and the new methods of research which have been introduced have called for new tools; tools of yet greater efficiency and yet greater power than those hitherto used.

When I mention new tools I am thinking of the great new wind tunnels of America and Europe, the new testing tanks built especially for seaplanes, and the Farnborough vertical spinning tunnel, the first of its kind. Nearly all of these have already been described somewhere, but I do not think that there has been any comparative study of them in relation to the objects sought to be attained and this I propose to attempt.

There is to begin with an enormous difference of scale between the new aeronautical tools being provided for workers in this country and those thought necessary, let us say, in America. Are we right in expecting that by taking sufficient thought we can add a cubit to the stature of our relatively diminutive equipment? It is a fascinating question and I propose to study with you what is the real and true answer. That answer, as I shall try to show, is a not disquieting one. If like Wilbur Wright our tools are relatively modest, our aims like his can be equally unbounded.

The right place for carrying out scientific measurement is the laboratory, but aircraft, even the smallest, are unfortunately too big to get in, or at any rate they were until quite lately. If we have to make the measurements on models it is most necessary that we should know how to apply the results so found to the full sized aircraft. This application is no easy matter. The force which motion through the air applies to any structure may be very nearly proportional to the square of the speed, but it is not quite. The actual law brings in the coefficient known as the Reynolds number. Thus we can write

$$F = V^2 L^2 \cdot f(R)$$

where F is the force, V is the velocity, L is the principal length and R is what is known as the Reynolds number. If the Reynolds number factor were constant —which it is not—it would be easy to transfer our results from model to full-scale. Actually it varies with the velocity, the length and the kinematic viscosity of the fluid in which the motion takes place.

We may either ignore the change of Reynolds number, except for those experiments in which we know we dare not; or we may by some artifice cause the Reynolds number to have the same value in the model experiment as we know it will have on the full-scale. All the older wind tunnels had no alternative but to do the former, but the new tunnels aim at the reproduction of the actual Reynolds number.

Before, however, I describe these new tools I must say something about the research organisation which schemes, designs and uses them.

Research Organisation

The research organisation in this country is so familiar in its general outlines that I need not say much about it. Its most striking feature is the extent to which the Government participates. All aircraft constructors and aero engine builders carry out researches in their wind tunnels, tanks and laboratories, chiefly, of course, in relation to their own special problems, but the work they do is none the less important because of that natural limitation. The Universities also carry out investigations which are similar in type but with the wider horizons appropriate to them. The Governmental organisation partakes of both qualities; there are the long range investigations aiming at the discovery of new methods of solving our problems and the shorter range ones in which the endeavour is to find a cure for some immediate difficulty. The application of the results is left to the department of technical development.

Some industries languish because insufficient support is given to research and some because of an inability to find the funds for the development of new and promising finds when made by the research workers. This, however, is far from the case with the aeronautical industry where Governmental aid is readily forthcoming, not merely for the carrying out of the researches but for their subsequent utilisation. I venture to submit that the methods adopted by this country to promote the rapid progress of aeronautical science are as much a matter of satisfaction, as the results attained by our constructors are a matter of national pride.

It was due to the world-wide interest in aviation, aroused by the splendid work of the brothers Wright, that we owe Lord Oxford's acceptance of Lord Haldane's proposal that an Aeronautical Advisory Committee should be set up by the Government. In the year 1909, therefore, there began that long continued inquiry by the newly-constituted Advisory Committee for Aeronautics, which later became the Aeronautical Research Committee, whose able work has added so greatly to the scientific reputation of this country. Its president was Lord Rayleigh, a man great in his scientific insight, assiduous in his labours, and a most genial and gracious fellow-worker to all who shared the labours of his Committee. Its chairman was Sir Richard Glazebrook who, most fortunately for us, has continued in that high office throughout the succeeding 23 years. Perhaps I may here quote the tribute paid to the work of this Committee by Professor R. V. Southwell in his James Forrest Lecture, before the Institution of Civil Engineers, in 1930:—"I believe, and I say this deliberately with some knowledge of other scientific committees, that in the Aeronautical Research Committee of this country we can show the world a model of what organisation for the control of wide-range research should be, . . . its special characteristic, I think, is the close personal association, effected by regular meetings, of its official members, the men who are actually engaged in the work, with its unofficial and external members—men who can contribute general ideas and suggestions based on a knowledge of allied subjects. . . . It has relieved the Committee of the burden of executive control, whilst retaining for it an effective voice in the guidance of fundamental research."

Scientific direction is exercised by this Committee over the work done in the Aerodynamics Department of the N.P.L.; further, it advises the Air Ministry as to any additions to, or modifications in, the aeronautical investigations carried out, under Air Council authority, by the Director of Scientific Research, at the works of the various aircraft constructors, at the Royal Aircraft Establishment, South Farnborough; at the Aeroplane Experimental Station, Martlesham; at the Marine Aircraft Station, Felixstowe; and at any other place where Air Ministry research work is in progress. To show the general scale of the work I might

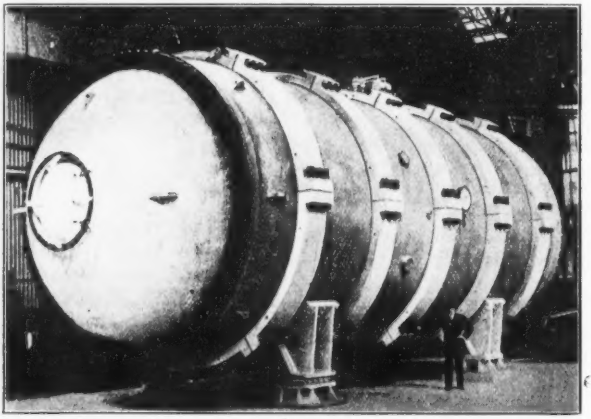

FIG. 1.
External view of N.P.L. Compressed Air Tunnel.

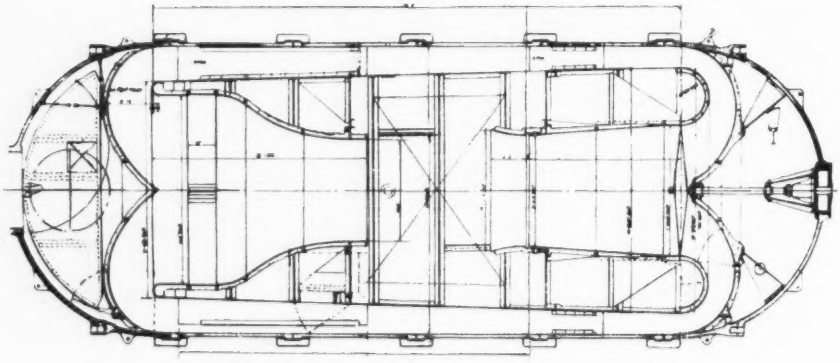

FIG. 2.
Diagrammatic view of N.P.L. Compressed Air Tunnel.

mention that the inclusive total of all expenditure on research by the Air Ministry is about a quarter of a million annually, and that the Ministry's own scientific research staff numbers about eighty* (or if those at the N.P.L. be included about a hundred).

* It is perhaps worth mentioning that the Universities represented are London 27; Cambridge 23; Oxford 4; all others 33.

This organisation was closely paralleled in the United States when in 1915 the Government of that country paid us the sincere compliment of themselves setting up a National Advisory Committee for Aeronautics with a research station at Langley Field, near the mouth of the historic Potomac River and within easy access of Washington. The chief difference between the two scientific organisations is that the American Director of Research is an officer of the Committee and not of the user departments; due, no doubt, to the fact that the Air Forces of the United States have not been unified as they have in this country. These two National Committees maintain close contact with each other by the exchange of reports and visits. It is a pleasure to acknowledge here the great assistance we have received from their investigations and the cordial and generous hospitality they have shown to us when in America. A third research committee recently formed is the aeronautical side of the Canadian National Research Committee with its experimental station at Ottawa. To that we wish every success.

It is interesting to compare our organisation for aeronautical research with that which obtains in other fields. Industrial research is aided, and in many cases directed, by the Department of Scientific and Industrial Research, under the authority of the Lord President of the Council. Under that same authority we also have the Medical Research Council which is doing such brilliant work at Hampstead under Sir Henry Dale; we have also the newly-founded Agricultural Research Council. Each of these has the assistance of the outside scientific world in much the same way as has the Air Ministry. I cannot imagine that we are yet at an end of such developments in our national organisation.

The Compressed Air Tunnel

I come now to our new research equipment. The compressed air tunnel may be said to be the first breakaway from earlier types, and when Dr. Ames, the distinguished chairman of the National Advisory Committee of Aeronautics in America, delivered the Wilbur Wright Lecture in 1923, the first tunnel of this new kind had just been completed in America, and had started on that extensive investigation of aerofoil characteristics for which it is now so well known. Ample fulfilment has followed the modest anticipation expressed by Dr. Ames. In his lecture he said: "If the use of these scale effect methods justifies our present hopes, we shall be able in a comparatively short time to place at the disposal of the designer of aircraft a wealth of information which should increase markedly the accuracy of his work."

As I have already mentioned, the forces which act upon aerodynamic surfaces depend upon the value of the Reynolds number. In the older form of atmospheric wind tunnel the Reynolds number was usually only about one-tenth of that of actual flight, and although this did not matter so much at moderate angles of incidence, it certainly did so when the stalling angle was approached. Much of importance can be investigated without running to large angles of incidence, but it is unfortunately the case that the conditions of motion which involve flying risk are the very ones in which large angles of incidence are, or may be, involved and which therefore cannot be accurately studied in the older forms of tunnel. One way of escape from this difficulty is to use denser air. Air compressed to ten atmospheres would do, but it is found better to run the pressure higher than this is so as to be able to use smaller models and lower speeds. In the American tunnel the pressure is 20 atmospheres and in the one recently constructed at the N.P.L. it is 25 atmospheres. The leading characteristics of these two tunnels are given in the following table taken from Mr. Relf's lecture last year to the British Association for the Advancement of Science:—

COMPARISON OF AMERICAN AND NATIONAL PHYSICAL LABORATORY TUNNELS.

	American Tunnel.	N.P.L. Tunnel.
Diameter of jet in feet	5	6
Pressure in atmospheres ...	20	25
Wind speed (ft. per sec.) ...	70	90
Reynolds number	R	1.93 R

It will be seen that the British tunnel can give a Reynolds number of nearly double the American. This is a natural increase as aeroplane speeds have risen substantially since the date of Dr. Ames' lecture, and we have, of course, been able to profit by the American experience so fully communicated to us by the American Advisory Committee.

The idea of using a compressed fluid is attributed by Mr. Relf to M. Margoulis and is dated as recently as 1920. In the following year a considered design on these lines, making use of compressed air, was put forward by Mr. McKinnon Wood, of the Farnborough Research Staff, and was considered by our Aeronautical Research Committee. It was not, however, until much later that construction was decided upon and in the meantime we were able to profit, as I have said, by the experience gained during the construction and use of the American tunnel.

It is natural to ask why, if a fluid of higher density, or rather lower kinematic viscosity is required, water should not be used instead of air. Water has only one-thirteenth of the kinematic viscosity of air, so that a model to a scale of one-thirteenth could be tested at the correct Reynolds number by being immersed in a water stream having the speed of flight of the full-sized aircraft. This is not so attractive a proposition as it may at first seem. The force on the model would be proportional to the density of the fluid and would therefore be no less than 800 times as great as in the wind tunnel. This would not only call for a very sturdily built model, but for supports so strong and so large as to interfere materially with the air flow on the model. The use of water would therefore not be desirable.

The Large Air Tunnel at Farnborough

Instead of getting the Reynolds number right by increasing the density of the air, it is possible to proceed by means of an increase of linear scale. If only we could use full-sized aircraft and employ an air speed equal to the speed of flight our object would, of course, be attained in the most perfect way. The stimulus to build a tunnel capable of taking a complete fuselage, engine and airscrew came from the United States, where great success had been achieved by the use of a closed-return circuit tunnel having a jet of 20ft. in diameter and driven by two Diesel engines of an aggregate power of 2,000 h.p. This was first put to work some five years ago. The results of experimental work done in this Propeller Research Tunnel, as it was called, were so useful that the National Advisory Committee for Aeronautics put on record their opinion that: " By the application of the results of this study to a Curtiss AT-5A army pursuit training airplane, the maximum speed was increased from 118 to 137 miles per hour. This is equivalent to providing approximately 83 additional horsepower without additional weight or cost of engine fuel consumption, or weight of structure. This single contribution will repay the cost of the propeller research tunnel many times and fully justifies the Committee, not only in having built such a tunnel, but also in recommending as it does that additional funds be provided next year for the construction of a full-scale wind tunnel. Never before in the Committee's history, or in the history of the development of aero-

nautics, has the value of a new piece of scientific equipment been so well demonstrated."

Emboldened by the success of this work, the American Government has now completed, also at Langley Field, a gigantic tunnel having a cross section of the jet of no less than 60ft. by 30ft. propelled by 6,500 horse-power; whilst the French Government are understood to have in hand the construction of a tunnel of similar capacity.

On the question whether we should build a very large tunnel for use in this country, the Air Ministry asked the advice of the Aeronautical Research Committee. That Committee advised that: "There are three main classes of research which could be better and more economically performed in a large wind tunnel than by other means, viz., (1) experiments on the cooling of air-

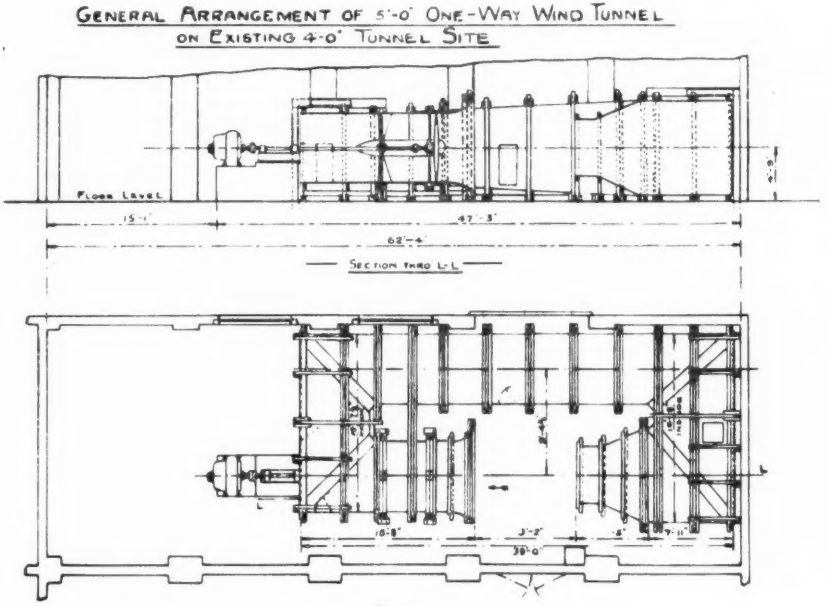

FIG. 3.

R.A.E. 5ft. Tunnel (model for 24ft.).

cooled and water-cooled engines; (2) measurements directed towards the reduction of the resistance of the central parts of actual airplanes; and (3) tests of full-scale airscrews." In support of this view the Committee pointed out that one of the biggest problems in modern airplane development was to instal an air-cooled engine in a fuselage and ensure adequate cooling of the cylinders without an undue increase of drag. There was considered to be evidence to suggest that it would be possible to design aircraft fitted with air-cooled engines to have a resistance little greater than that of aircraft with water-cooled engines, though facilities did not exist by which the problems involved could be satisfactorily attacked. Model experiments were considered to fail on account of the impracticability of reproducing cooling conditions, besides which there were inherent difficulties in controlling the conditions and in analysing the results of flight tests which render them both uncertain and costly.

A tunnel sufficiently large, and developing a sufficiently high wind speed, to permit the testing of actual airplane bodies and centre sections with their engines installed, was believed to be the only economical mode of attack on the problem. Whilst with the variables under the direct control of the investigator, more information could be obtained in a month in a large wind tunnel of this kind than from a year's flying. As regards dimensions, it was considered that the tunnel need only be large enough to include the central part of an airplane, that is the centre section, airscrew and fuselage. After full thought it was advised that there would be no material advantage in going beyond a jet of 24ft. diameter. Designs were, therefore, got out at Farnborough on that basis and a model was made of the proposed design. This model had a 5ft. jet. For economy of power a closed-return circuit was decided upon, and after the model tunnel with its four sets of guide blades for steering the air round the four right-angle bends had been constructed, a very uniform distribution of air velocity over the jet was found to be obtainable. Not only was this model tunnel of service in assisting in the design of the 24ft. tunnel, but it was subsequently found to be a very useful piece of equipment in itself. The motor initially pro-

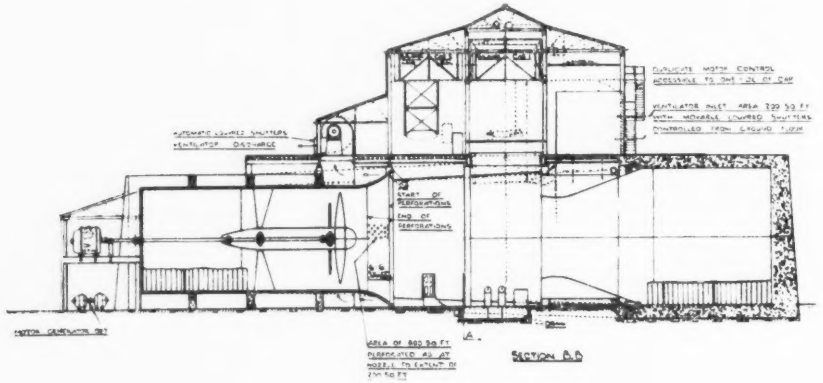

FIG. 4.
R.A.E. design for 24ft. Tunnel.

vided was of but 75 horse-power, giving a maximum speed of 115 miles an hour, quite enough to enable the tunnel to be of very real service in the study of aileron flutter, but with the much larger motor of 500 h.p. now being installed, which is expected to give a speed of 215 miles an hour, this tunnel should also be of permanent use for model airscrew investigations.

The reason why closed circuits are now nearly always preferred, apart from their greater compactness, is the lower cost of power for maintenance. The air which passes the jet still has a good deal of energy left by the time it comes round to the airscrew again, and it does not have to be started up from rest as in the older type of tunnel. Of course, if there were no air resistance at all, the air circulation once started would go on for ever. Actually, of course, energy is lost by friction and a certain additional supply has to be put in by the electric motor and fan. The higher the ratio of the energy passing the jet per second to the energy supplied per second by the motor, the more efficient is the tunnel design. This figure is known as the " energy ratio." I give in the table below some figures for the " energy ratio " of a number of tunnels of different types. For the open tunnels the ratio is rarely over one-half, whereas for the closed it is usually between two and three—a most impressive difference.

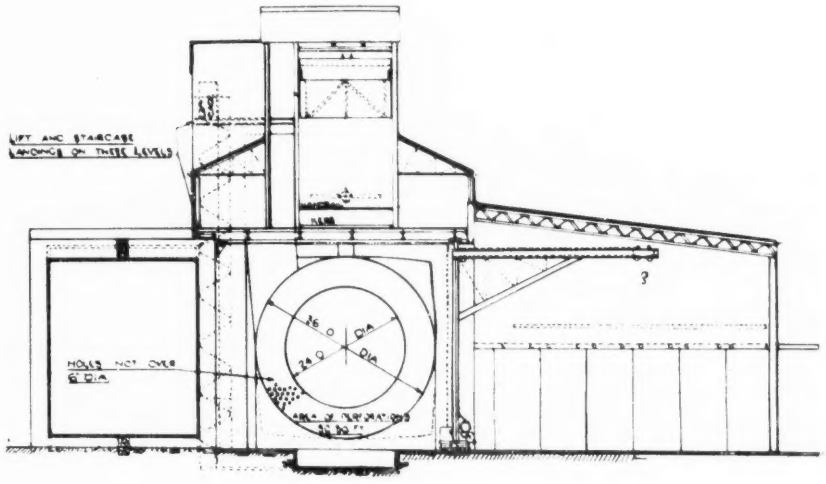

FIG. 5.

R.A.E. design for 24ft. Tunnel; another view.

WIND TUNNELS.

Description	Size of jet.	Speed.	Pressure: Atmospheres.	H.P.	Ratio of energy passing per sec. to input to fan motor.	Nature of circuit.
N.P.L. 7ft. No. 1	7ft. × 7ft.	67 f.s.	1	60	0.53	Open
,, No. 2	7ft. × 7ft.	83 f.s.	1	120	0.51	,,
,, No. 3	7ft. × 7ft.	96 f.s.	1	200	0.48	,,
N.P.L. Duplex	14ft. × 7ft.	100 f.s.	1	400	0.53	,,
N.P.L. C.A.T.	6ft. diam.	90 f.s.	25	500	2.3	Closed
N.P.L. 9ft. × 7ft.	9ft. × 7ft.	210 f.s. (expected)	1	400	2.6	,,
R.A.E. 7ft. No. 1	7ft. × 7ft.	90 f.s.	1	125	0.61	Open
,, No. 2	7ft. × 7ft.	140 f.s.	1	300	0.95	,,
R.A.E. 5ft. low speed ...	5ft. diam.	162 f.s.	1	75	2.4	Closed
R.A.E. 5ft. high speed ...	5ft. diam.	315 f.s. (expected)	1	500	2.4	,,
R.A.E. 24ft.	24ft. diam.	176 f.s. (expected)	1	2000	2.4	,,
N.A.C.A. C.A.T. (before reconstruction)	5ft. diam.	74 f.s.	20	250	1.35	Closed
N.A.C.A. 20ft.	20ft. diam.	162 f.s.	1	2000 (Diesel)	1.45	,,
N.A.C.A. 60ft. × 30ft. ...	60ft. × 30ft.	169 f.s.	1	6500	2.2	,,

It is true that in a tunnel of any sort the provision of an open jet calls for rather more power than a walled-in jet would need. This is due to the mixing of the air at the boundary of the open jet, but the compensating advantages of greater facility of access, and of the ability to insert in the jet portions of large models, are so great as more than to balance this small disadvantage.

In the new Farnborough tunnel the jet will be, as I have said, 24ft. in diameter, and it is estimated that with the provision of 2,000 h.p. a speed of 120 miles per hour can be attained. Moreover, the general lay-out of the

building enables an airplane having a wing span of as much as 56ft. to be got in. The initial work on which it is proposed to put the tunnel immediately it is ready is the investigation of the air-cooling of engines, the performance of airscrews, the effect of excrescences on the fuselage in adding to resistance or adversely affecting the flow near the tail, and on the draughtiness of cockpits.

One of the points which need to be foreseen in the construction of a closed circuit tunnel, in which actual aero engines are to work, is that any poisonous gases formed in the exhaust will pass into the circulating air and are likely to have unpleasant if not dangerous consequences for the experimental staff. This would not only need to be considered when doped fuels were being used, but also when working on ordinary motor spirit, since if the carburation is imperfect some proportion of carbon monoxide is likely to be formed. This has been carefully looked into by my research staff, and it is estimated that about 250,000 cubic feet of fresh air need to be drawn in per minute in order to ensure the degree of dilution necessary for absolute safety. This fresh air has also the advantage of steadying the temperature in the tunnel, which otherwise would tend to rise steadily. The fresh air is introduced around the inlet jet, and the surplus is drawn away from the periphery of the exit cone. In Mr. McKinnon Wood's description of the 5ft. model for this tunnel, given to the British Association last year, he explained how the outer part of the jet was found to mix extensively with the surrounding air as it progressed across the test chamber, whilst the inner cone proceeded at unchanged speed and pressure. Some 25 per cent. excess air was found to be entrained in the motion and returned to the room from the lip of the collector. The energy wasted in this diversion of momentum was about 20 per cent. of the energy of the jet and exceeded half the total power consumed. Other experiments made by Mr. Wood have shown that when gas was introduced into the axis of the jet it became fairly evenly distributed across the stream at the end of a circuit, showing that the boundary of the jet is a fitting point at which to remove surplus air.

The question may be asked whether it would not be better to make the jet so large that the wings of the airplane under test would be immersed in the stream and not merely the central parts. The answer is that there is no occasion to do this since we already have the means of measuring the performance of full-sized wings by means of the Parnall research monoplane, to which wings of the most various types can be attached, and the lift and drag forces upon them measured during flight by a kind of internal steelyard attachment. What, however, cannot be done in flight is modification of the engine cowling with simultaneous observation of cylinder head temperatures and change in drag of the aircraft. The airplane has to land every time any modification is required to be made and this makes the tests both tedious and expensive. Hence a tunnel of this size is confidently expected to give us all the information which we require and I do not anticipate any need to build a bigger one either now or hereafter.

R.A.E. Seaplane Model Testing Tank

Another new tool is the seaplane model testing tank being built at Farnborough. It is not absolutely the first tank to be built in this country entirely for seaplane work as the well-known firm of Short Bros. had built at Rochester a little tank which, though but 5ft. wide, had been shown to be capable of giving most valuable service. The success of that little tank is due, however, in no small measure to the great skill of those in charge of the experimental work carried out in it.

It was very natural when seaplanes first began to be designed that the model testing tanks already in use for the design of the hulls of sea-going craft should be made use of. Testing tanks of some kind were obviously required, and these were the only ones available. It was natural, too, that once such work was undertaken, the testing procedure should follow that which had been in

force for many years for purposes of ship design. It does not follow, however, that the procedure best suited to the one would be the procedure most suited to the other. After all it is only at the beginning and end of a flight that the seaplane is in contact with the water, and although these two episodes are exceedingly important, they are of a short duration and involve a rapidly changing speed, ascending when taking-off and descending when landing. When it was decided to break away from this practice and build a tank specially suited to the needs of seaplane work, the first thing to settle was how large the tank would need to be and at what speed the model should be propelled. Indications

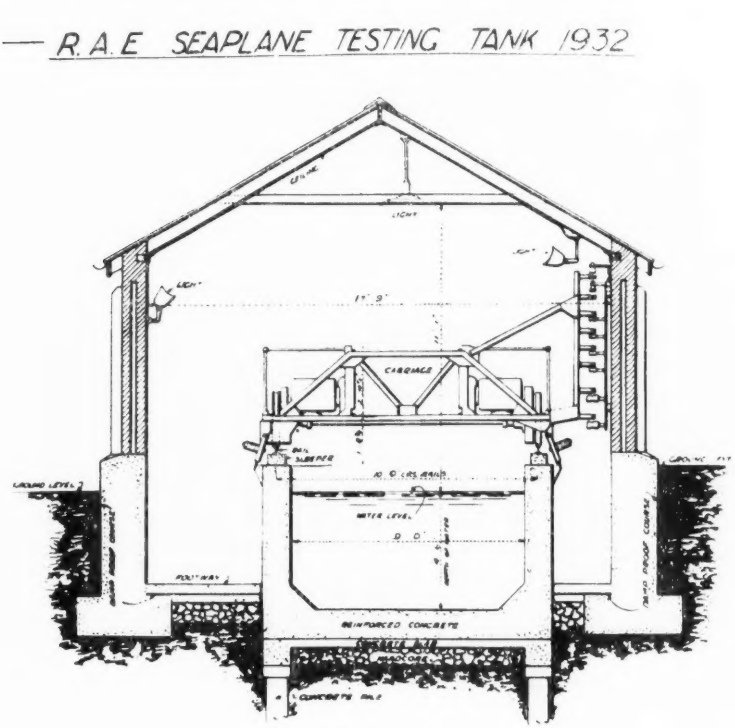

FIG. 6.
R.A.E. Tank, diagrammatic view.

of cost required that the tank should be no bigger than circumstances really required, and on this point much diversity of opinion existed. There is a good illustration of this in the recent building for the work of the National Advisory Committee for Aeronautics of the United States of a seaplane testing tank, stated to be capable of speeds of 50 m.p.h. or more, with a cross section of 24ft. in width by 12ft. in depth, and no less than 2,000ft. long. I understand that a similar one, also entirely for seaplane work, is being built in France. Now the thought that we have given to the matter in this country has led to quite other conclusions. Our conclusion has been that a tank 9ft. in width by $4\frac{1}{2}$ft. in depth and only 650ft. long would do what was necessary. And it is

interesting to note that the new aeronautical tank at Ottawa has a beam, like ours, of 9ft., a depth of 6ft., and a length of about 400ft. It must be remembered, too, that the bigger the tank the greater the cost, the heavier the carriage (ours weighs only some three or four tons) and the longer the time taken in arranging the experiments. We have also to study the question of the speed at which the model is to be towed, for not only is the American tank twenty times the cubic capacity of ours, but in it speeds of 50 miles an hour are contemplated compared with the 40ft. per second (27 miles an hour) at which we are aiming! Are we being too modest?

To answer this I must explain how we arrive at the speed appropriate to the size of the model to be used. The law of similarity of ships and their models was laid down many years ago by Froude, and it required that the ratio of the

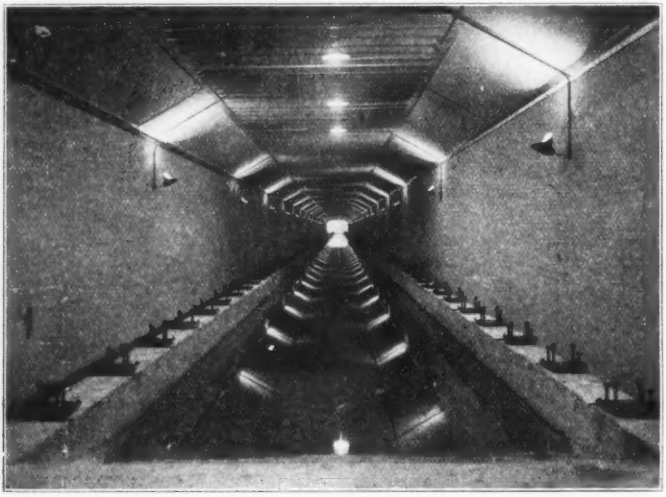

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FIG. 7.

R.A.E. Tank, as in April, 1932.

speed to the square root of the length should be the same for full-scale and for model. This conclusion was arrived at after a consideration of the loss of energy due to wave making. In the case of a ship this provides the bulk of the resistance, the balance being due to an item for skin friction which is not difficult to compute. In the case of seaplane models the wave making takes up an even larger proportion of the energy and the skin friction effect is negligible provided that the model is of sufficient length to ensure that over the greater part of it the boundary layer is turbulent. If we suppose that we desire to make measurements on the model of a very large flying boat, say 110ft. in over-all length, the length at the water line when at rest will be about 80ft., and a model to a ninth scale would have a length just equal to the width of the tank, namely, 9ft. If the taking-off speed of the boat were 60 knots, the equivalent speed at which the model must be towed would be 35ft. per sec., or well within the 40ft. per second which I named above as the full speed of the tank carriage. When much larger models and higher speeds are required for any unusual purpose, we can fall back on an extension of the experiment now being carried out at Felixstowe in which a Moth fuselage is used to " taxy " a 25ft. model of a flying boat hull

(in this case a 1/2.4 scale model of Singapore II) by means of a force recording undercarriage—an experiment in which we have gladly drawn upon experience gained by the Berlin D.V.L. I submit, therefore, that a tank of the size and speed proposed will cover the whole range required for tank experimentation; but there are still some questions to be asked. First, is a model length equal to the width of the tank not too large a model for accurate work, and are the speeds at which we shall be running the model too close to the speed of the natural wave motion of the surface of the water when disturbed? As regards the former, Sir Horace Lamb communicated some years ago to the Aeronautical Research Committee* a paper showing that in the case of ship hulls there should be a definite relationship between the accuracy of the measurement and the ratio of the beam of the tank to the length of the model. After considering the

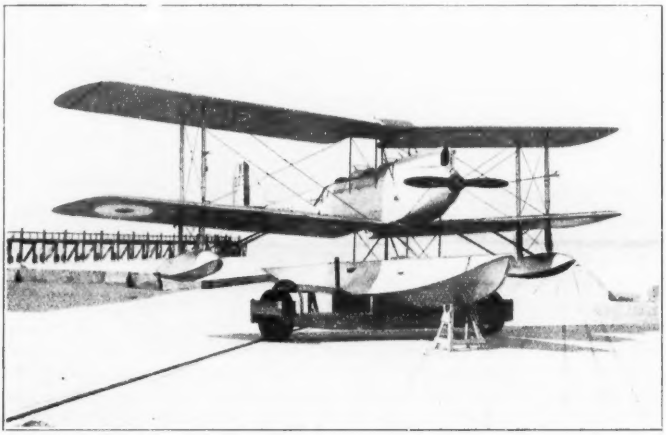

FIG. 8.

Felixstowe experiment for measuring forces on hulls.

application of this work to the shallow draught seaplane models proposed to be tested in the new tank, it was concluded by the Committee that with models 7ft. or 8ft. long the errors in the resistance test would not be likely to exceed 5 per cent. and would probably be less; whilst experience in testing would enable corrections to be applied, appreciably reducing any uncertainties. With ships it is easy to consider the relationship of the ratio of draught to beam, and to tank size, but with seaplanes it is not so easy; for one thing the draught is very small in relation to the beam even when the seaplane is at rest, whilst when moving at taxying speed the seaplane is partly air-borne and the draught becomes increasingly less, until at take-off it is zero. And so we came to the conclusion that, remembering the advantages gained by the use of a light carriage, the dimensions chosen would give us a tool of great value, one which in a marked degree would assist design, and that we should not be justified in recommending the great increase in expenditure required for a large tank.

When the new tank at Farnborough is used in the orthodox way, that is, by making the measurements whilst the model is being towed at a steady speed, the whole 650ft. of travel will be made up as follows: First we need to allow about 100ft. for the length of the carriage and 200ft. for emergency braking at the end

* R. & M. 1010.

of the run, leaving 620ft. to be divided between 190ft. of the initial acceleration (at 4.2ft. per sec. per sec.); 130ft. of braking at the end of the run (at 6ft. per sec. per sec.); and in between these two a steady run of 300ft. at a speed of 40ft. per sec. We shall, however, certainly explore the possibility of dispensing with the run at a steady speed. So far as I know this has never been done and it means making measurements when the speed is rising or falling. The technique may be difficult, but as I have explained, we are not really interested in the constant speed run, though exceedingly interested in the take-off and landing. We should, therefore, prefer to cut out the 300 feet of steady run and divide it between the accelerating and braking runs so as to enable a speed of 50ft. or 55ft. per second to be obtained, making measurements during either the acceleration or retardation periods, or both. The resistance offered by the water must be different when the speed is rising, and it is precisely this condition which we wish to study, since this is the important one in the case of the full-scale aircraft. This effort will first require a thorough and careful study of the characteristics of the new tank and its carriage. Then if full use is to be made of this procedure we shall need to have models not merely geometrically similar to the full-sized aircraft, but dynamically similar also; and in addition we must see that the measuring attachments and balance parts are so lightly constructed as not appreciably to add to the mass of the model. As regards the application to this case of the principle of dynamic similarity, I cannot do better than quote Professor Geoffrey Taylor who, in his Wilbur Wright Lecture in 1921, said:—"The difficulty in applying the principle is due to the fact that the forces concerned are due largely to causes which are not completely under our control. When we alter the dimensions of the system we alter the forces which arise in it owing to the weight, elasticity, or other physical properties of the material of which it is constructed. Unless these forces are altered in the correct ratio the new system will not be dynamically possible. Unfortunately if, as is almost invariably the case, there are more than three distinct causes of forces in the system, it is impossible to find any system in which the forces due to all the causes are in the correct ratio. It is, therefore, impossible ever to get complete dynamical similarity. On the other hand, it is frequently possible to guess, or it is known by experiment, that some of the causes produce very little effect on the motion." It is along these latter lines that we shall proceed, and if we meet with success there will be opened up the prospect of investigating on model scale the troublesome phenomenon of porpoising. Porpoising is the name given to the dangerous motion which sometimes arises when a seaplane is taking-off even on quite a calm sea. It consists of a rapidly increasing pitching oscillation which imposes great stresses on the hull and great practical difficulties on the pilot. The subject is one which has never been adequately studied. A great array of factors is involved—mass and moment of inertia, water forces and air forces, three degrees of freedom—in a greater or less degree. In our experimental work we shall use for this investigation a virtual model of the complete seaplane. Theoretical work indicates the importance of including the variation of the air forces as the seaplane pitches.

The Farnborough tank and its containing building are now completed, but it has yet to be fitted with its carriage and the measuring apparatus. The carriage will run on steel rails with steel treads to its wheels, but it may later be found advisable to fit rubber treads, particularly if very high adhesive coefficients are required. Careful attention has been given to the programme of work on which the tank will be set as soon as it is ready. The first work will naturally be the carrying out of routine tests on proposed new seaplane designs, following the older methods of test. These routine tests will aim at discovering the chief qualities of the newly-designed hull. Has it:—

(1) Adequate acceleration at the largest load contemplated?

(2) Clean running so that the airscrews and tailplane are not damaged?

(3) Sufficient longitudinal and lateral stability?
(4) Small impact on landing?
(5) Seaworthiness?

Later an attack will, as I have said, be made on accelerated motion. This would have three possible applications. To improve routine testing by increasing the speed range and decreasing the time taken to cover a given number of tests, to ascertain the effect of acceleration on longitudinal stability, and to measure virtual mass effects in connection with scale effect comparisons and the prediction of the length and time of take-off of full-scale seaplanes. From the point of view of testing a stable model the technique is not considered by my staff to be very difficult, since the acceleration in the direction of motion will be constant. The study of porpoising in the tank is likely to present a difficult problem. It is proposed to begin the attack by choosing a hull known to be unstable or only just stable; to construct a model of the correct mass and moment of inertia and ascertain the influence of the following factors:—

(*a*) Freedom of motion in the fore and aft direction.
(*b*) Mass and moment of inertia of the model.
(*c*) Acceleration and direction of motion.
(*d*) Damping due to the wings and tailplane.

In addition, the corresponding measurements during deceleration will be made.

I hope what I have said will be thought to justify our expectation that a tank of these relatively modest dimensions will satisfy our requirements for many years to come.

The R.A.E. Vertical Tunnel

I now come to the newest and, as I think, the most intriguing of all our new research equipment, namely, the new vertical tunnel at Farnborough for the investigation of spinning. Unlike all the other equipment I have mentioned, this gives such entire freedom to the model that during the whole of the experimentation it is in actual free flight. In support of this method of investigation I think I may quote from Mr. Handley Page's Wilbur Wright Lecture in 1928: "The work of Lilienthal in gliding with curved wings had shown that the secret of success was to be found in free flight experiment." Surely there can be little doubt that this procedure is also the best for spinning. Aeronautics has been described by Professor Southwell "as heavy engineering made more difficult." In the case of spinning motions it is not merely more difficult, it is too difficult—too difficult at least for that method of mathematical analysis which in the simpler aeroplane motions has been productive of such useful results. I hope I am not showing that I expect too much of mathematical methods; indeed I rarely expect from them predictions of new forms of aeroplane motion, but rather an essential means of transferring information derived from one set of experiments to other sizes of craft and other speeds of motion. I daresay these methods would also in time give us what we need in the case of the highly complicated and unsteady motion known as the spin, but it is not possible to wait. The practical need for information as to how to design or to modify aircraft so as to be free from dangerous types of spin is too urgent for that.

I had long been attracted by the idea of being able to watch the vertical motion of bodies in an ascending current of air, in which the vertical velocity is made just to balance the rate of descent of the model, so that the latter appears at a constant height in the jet. Hence, when the method of dropping models from the roof of the balloon shed at Farnborough had to come to an end by reason of the necessary demolition of the shed, I supported vigorously the construction of a vertical tunnel at the R.A.E. for spinning work. The first step was to build a little model tunnel two feet in diameter. This worked admirably. The models

showed each of the various types of spin known to exist, and above all they seemed to have a most happy desire to avoid running into the tunnel walls. The tunnel was shown at work to the Royal Society, to the Royal Institution and to this Society. Steps were then taken to improvise in an existing building a 12ft. tunnel 30 feet long and having an air speed of 30ft. per second. This was completed and put to work just before the end of last year. The models used in it have to be not only geometrically similar, but dynamically similar to the full-sized machine. Hence the dimensions, the mass and the moments of inertia all need to be to the proper scale. The models are made of the very light balsa wood with panels cut out of the wings and covered with thin paper, and ballasted when necessary with lead. It is usual to employ the tunnel not merely to observe the type of spin, but to study the motion which occurs when the controls are suddenly moved over by a delay action mechanism incorporated in the model.

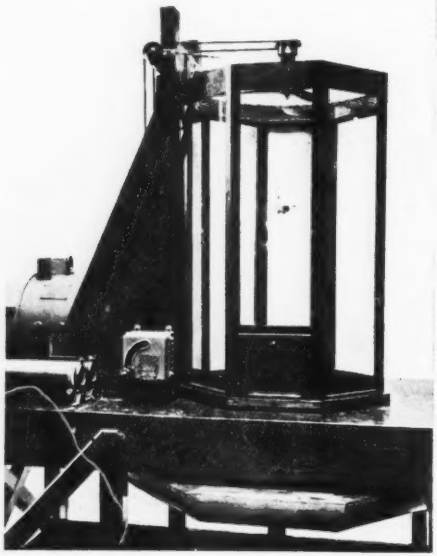

FIG. 9.
R.A.E. Model Vertical Tunnel (2ft. diam.).

This tunnel is not the first to be built with a vertical axis. There exists at Langley Field a vertical tunnel built especially for spinning investigations, but in it the air moves *downwards* instead of upwards, so that free flight is not possible. Indeed, the aim of the American tunnel was quite otherwise, namely, to enable the forces and couples acting upon a model rotating about an axis to be measured without the complication of the force of gravity being at right angles to that axis, as in a horizontal tunnel it would be, and this aim it has successfully achieved.

An immense amount of theoretical work has been done in this country in the motion of a spinning airplane—most of it at the N.P.L. The motion is, however, excessively complicated and the mathematical work is difficult to apply usefully without the lengthy preliminary of an experimental determination of

the various derivatives characteristic of the particular aeroplane under investigation. And if so many measurements have to be made on each airplane, it is simpler to put the model straight into the spinning tunnel and let it do the calculations for itself. We have already found that raising the horizontal tail surfaces is of benefit in preventing the fast flat spin from developing.

In my own view there is probably no type of spin out of which a skilful pilot could not make recovery to normal flight, given time. But time is just what is not given. In the spin, height is lost rapidly and recovery must be made before it is all lost.

The Visualisation of Air Flow

Time is getting on, but there is one important matter to which I must refer. The problem of rendering visible the flow of air is no new one, but important improvements have recently been made in the technique. At Teddington this has taken the form of obtaining shadowgraphs of heated air and both there and at

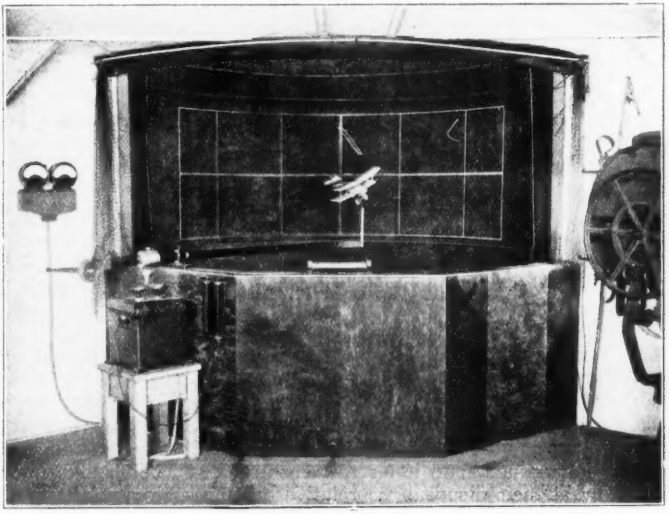

FIG. 10. *Crown Copyright reserved.*

R.A.E. Vertical Tunnel (12ft. diam.).

Cambridge of the extended use in a small wind tunnel of the smoke from titanium tetra-chloride.

In investigating the flow in or near the boundary layer it is of great assistance to employ a wind tunnel in which the flow is non-turbulent. The means by which turbulence may be reduced have been investigated theoretically by G. I. Taylor and a small tunnel with a working section 1ft. in diameter has been built at the N.P.L. The tunnel has a rapidly contracting inlet of large contraction ratio, with a honeycomb diffuser at the mouth of the inlet, and an extension enclosing the working section. With this form of tunnel the average variation in the longitudinal velocity, as measured by an electrically heated wire recording on an oscillograph, was less than one-fiftieth of that found in the 7ft. tunnels at the N.P.L. The use of smoke is exceedingly convenient when the air flow is not too rapid as the diagrams, published by Messrs. Simmons and

Dewey* of the N.P.L., admirably show. At high speeds it becomes difficult to follow visually what is happening, and it is then possible to take advantage of the method developed by Mr. Townend† at the N.P.L. whereby an electrically heated wire is placed at right angles to the air current. The stream of heated air in the wake of the wire persists for some time and its shadow can be thrown on a screen and be viewed stroboscopically or be photographed. This method has proved of great use in studying the flow past airscrews, whilst its application to the flow round a slotted aerofoil has been equally useful.

Another development also at the N.P.L. is the use of a microscope for the visual examination of fluid motion exceedingly near to the boundary surface. The fluid used in this case was ordinary tap water, which was found to have plenty of " objects " on which to focus! Another method applicable to water flow is the use of tiny oil drops illuminated by a powerful source of light; this method has been successfully developed at Cambridge to throw further light on the phenomenon of the initial enhanced lift on aerofoils at the beginning of any new motion. The relationship of this to the landing of aeroplanes and the loads imposed when suddenly pulling out of a dive has yet to be explored and it may prove to be of great importance.

The Suppression of Noise

Many other new research tools of less impressive dimensions have been introduced since the date of Dr. Ames' lecture, but I cannot attempt in one short hour to include more than a glance at some of them. I must, however, say a little about the very hopeful attack which has been made on the suppression of aircraft noise.

It may, I think, be fairly said that noise is at present the greatest deterrent to air travel. The engine and airscrew are equally responsible. The victims may be the passengers carried or the citizens whose homes lie on the air routes. If the creation of the noise could be suppressed entirely at its very source both would benefit; if the noise were merely prevented from entering the airplane cabin those on the ground would be no better off, though the passengers would be happier. The aim of research must be the elimination of the noise at its source, but since this is a long and difficult task, it is necessary as an intermediate step to study how to prevent the external noise from penetrating the cabin walls. As the figures I shall presently give will show, a fair measure of success has been attained, and if aircraft constructors would make more use of information now at their disposal the relative quietness already attained in some aircraft might be achieved in very many more.

One's first aim in an investigation of this kind is to provide a means of measuring the noise—not in absolute units but on the same sort of scale as that employed by the human ear. It would be of no advantage to the human ear, for example, to suppress all noises under 20 or over 20,000 vibrations per second, because the ear would hear neither the one nor the other whatever their intensity. Hence the ear must be a part, directly or indirectly, of our measuring apparatus. Such an apparatus is the Barkhausen Audiometer. This instrument causes a loud hum, of easily variable intensity, to be heard when a telephone earpiece is put to the ear. The other ear listens to the noise to be measured, and by varying the loudness of the hum from the audiometer a balance of noise can be struck and the scale on the instrument be read off. The scale gives the noise intensity in units known as decibels, these useful transatlantic units which have found an equally welcome reception on both sides of the ocean. The word itself enshrines the memory of the great Canadian telephone engineer, Graham Bell.

* R. & M. 1335.
† R. & M. 1349.

A curious feature of the sense of hearing—as of our other senses—is that a logarithmic scale is employed. This was discovered many years ago by Fechner. In his "Text-book of Psychology" William James states Fechner's law in the following form: "To get equal positive additions to the sensation, one must make equal relative additions to the stimulus." Put into mathematical language, this means that if the sensation increases by arithmetical progression, the producing stimulus must be increasing by a geometrical one (Prof. Perry's "Compound Interest Law"); or, in even more familiar terms, the sensation is proportional to the logarithm of the stimulus. The audiometer follows suit and is graduated in accordance with the equation:—

$$(\text{Noise in decibels}) = 10 \times \log_{10} (\text{sound energy ratio}).$$

The ratio is relative to the agreed conventional base corresponding to a pressure of a millidyne per square centimetre.

It happens that a change of sound intensity of one decibel is about the smallest change the ear can notice. If the intensity is steadily increased the limit is reached at about 130 decibels, when the noise is too painful for hearing to go further. These limits are naturally linked with the frequency of the note; it could not well be otherwise, seeing that as I have stated frequencies below 20 and above 20,000 are not heard by the ear at all.

In the first attack on the aircraft problem the investigator can deal with the mixture of frequencies which make up airplane noise without attempting to disentangle the mixture, just as photometric work can be done with a white light made up of a great mass of different wave-lengths. Telephone engineers adopt also the convention of defining a zero intensity level, corresponding to an average speech intensity close to the mouth, of 1 micro-watt per sq. cm., other intensities being measured in decibels above or below this level. It is better for our purpose, however, to avoid negative numbers of decibels, and to consider the problem in relation to the scale already mentioned of 0 to 130 decibels. In this scale the various common sounds can be grouped as follows:—

Decibels.	Noise.
10	Rustle of leaves.
20	Whisper.
40—70	Usual range of speech.
70	Busy street.
70	Corridor of railway train.
90	New York sub-way.
100	Aeroplane.

On this scale a railway carriage is seen to have a noise level of about 70 decibels and an aero engine about 100 decibels. An airscrew having a high tip speed may also reach the 100 decibel level given for the aero engine. It might be thought that with both engine and airscrew at work the resulting noise level must add up to 200 decibels, but this is not so. On the logarithmic scale 100 added to 100 yields not 200 but 103. (In this very curious world of hearing it happens that while 3 and 3 do very nearly make 6; 30 and 30 do not by any means add up to 60.)

Since a noise of 100 decibels added to another of the same intensity give a combined noise level of 103 decibels, it follows that with two such noises present it is almost no use to suppress one only—that merely reduces the noise from 103 to 100. But if both are suppressed the resulting noise sinks from 103 to zero. A forcible illustration of the inadequacy of half measures!

Experience shows that by reducing the tip speed of the airscrew to some value not exceeding 600ft. per second, the noise level can be reduced to 60 or 70 decibels. It is not easy to reduce the engine noise to the same degree, partly because the engine clatter is nearly as bad as the engine exhaust, whilst for the

reasons already given it is of little service to reduce the one without the other. However, progress is being made, though I fear it must be slow. It is fortunate for the passengers, however, that the noise in the cabin can be reduced by 20 decibels or more by the efficient lagging of the walls and general care in layout of exhaust pipes in relation to wings. Care in all these directions has shown that it is possible to make the cabin of an aircraft no noisier than an ordinary railway carriage, so that conversation at an ordinary tone of voice is easily possible. This excellent result has, for example, been attained in the Short " Kent " class of flying boat used on the Mediterranean Service and in the new large Handley Page machines on the Paris Service. It is much to be hoped that other aircraft builders will follow this excellent example; and certainly there is no reason why the public should not now demand a really high standard in this regard.

Conclusion

Henry Ford, in one of his vigorous volumes, advises his motor car people to " simplificate and add more lightness." The phrasing is striking to English ears, and had it not been so I might not have remembered it, but the advice is sound and it applies not only to the sphere intended by its giver, but to that of aircraft construction. Are we adding " more lightness "? On this much might be said, but all I will say is that I see an increasing efficiency in both wing and fuselage design which certainly tends in this direction. But speeds are ever rising and the shocks on entering disturbed air seem to be rising too. This affects the load factors used in design. Such load factors need to be related to the " accelerometer readings " found under the new conditions of flight, and the obtaining of such measurements on a wide scale is now in hand. For this purpose we are using a variety of different forms of apparatus, including a new statistical instrument due to Mr. Farren, and an adaptation to aircraft of an accelerometer produced many years ago by Sir Keith Elphinstone and myself. The very conditions in which the flying of to-morrow is to be carried out may make the advice to " add more lightness " increasingly difficult to carry out.

Are we simplifying? I am not sure we are, and my doubt increases when I think of the growth of complexity in our control surfaces. I do not complain that they do not serve their purpose. They do. But complex they are and that complexity needs control. But who shall control the controls? As our grandfathers would have said, " Quis custodiet ipsos custodes?" and to that question I do not recollect that they made any answer.

And if I am asked, " To what great end is all this activity directed?" what is to be my reply? Can I truthfully say that it is imperatively bound to add to human happiness? I fear not. The provision by scientific research of increased power over nature produces greater happiness if, and only if, it is wisely employed. The world gathers knowledge faster than wisdom. The problem is frankly faced by Mr. Julian Huxley in his " What Dare I Think?" He says: " I do not share the facile optimism which sees in every increase of power, every fulfilment of a wish, a necessary good. The knowledge provided by science is emotionally and morally neutral. And so is the power of control which inevitably arises out of that knowledge. It is a tool which, like other tools, can be used for whatever ends its possessor sees fit, whether good, bad, or indifferent."

The benefits to be enjoyed from any new discovery, that of human flight for instance, turn, I suggest, less upon its mechanical perfection, however splendidly satisfying to the engineer, than upon the dreams and ideals of those who are able to guide its destiny and guard its use. " Where there is no vision, the people perish."

Have I made an unpardonable omission in saying nothing of the splendid record made by this country in the Schneider Trophy race? I yield to no one in my admiration for the energy, skill and courage that went to the making of that great achievement, but I scarcely like to include racing among research methods, new or old. Professor Southwell, in his address to the British Association in 1925, speculated on the policy that might then have been in the minds of the Air Council of Ruritania. But I do not think that it crossed even his mind, when surveying aeronautical problems of the past and the future, that the Government of Ruritania would seek with joy to enter into a great seaplane race with the one and only object of advancing aeronautical research. Much would be learnt, no doubt, but at a great cost in life and treasure. I for one, while grateful for all that we did learn, and we learnt much, do not in the least regret that the contest is now at an end. Am I rash in expressing this purely personal opinion? Of official opinions I naturally here know nothing. I am mindful of the discriminating advice given by the angel Raphael to Tobit: "It is good to keep close the secret of a king, but to reveal gloriously the works of God." The dazzling alternative thus permitted will attract the rightly daring—as it will no doubt the merely reckless. If, with justice but I hope with sorrow, you place me among the latter, judging my poor attempt to fall lamentably short of what so great a theme requires, I can but pray your gentle forbearance.

Acknowledgments

These are due first to the Air Ministry for the very generous loan of films and slides; also to the Director of the National Physical Laboratory, the Head of the Aerodynamics Division of that Establishment and his staff; to Sir John Reith and the staff of the British Broadcasting Corporation; to the Chief Superintendent of the Royal Aircraft Establishment and to Mr. McKinnon Wood who has been at especial pains to check the data I give on wind tunnels. For the opinions expressed I take, of course, sole responsibility.

Colonel the MASTER OF SEMPILL (Immediate Past-President of the Society), proposing a hearty vote of thanks to Mr. Wimperis, said it would be admitted by all that this was a very great occasion. There were present several who had heard every one of the twenty Wilbur Wright Memorial Lectures delivered, and they, together with everyone else present, would agree that never before had there been such an appropriate or brilliant setting for such a lecture as on this occasion. The Society's distinguished guest, Miss Earhart, had arrived in this country just in time to attend this function, bringing, if one might say so, an unwritten message from Mr. Orville Wright, and demonstrating in brilliant fashion all that had been done since his very distinguished brother and himself had set going the development in which all present were interested. Nothing could be more appropriate than that this meeting should be held under the wings of the machine which had made the first mechanical flight, almost under the wings of the first machine that had flown the Atlantic, and almost under the wings of the machine which held the world's speed record.

It was not the practice to discuss a Wilbur Wright Memorial Lecture, but it was a pleasure to be able to propose a vote of thanks to the lecturer, the Director of Scientific Research at the Air Ministry. No words were needed to add embellishment to his brilliant record, which was so well known, and which had been applauded heartily at the commencement of the proceedings. One could say, however, without fear of contradiction, that the lecture was one which would always be remembered by those who had heard it—a brilliant achievement in every way, dealing with many fundamental points in an interesting, practical and very often amusing manner, so that they would be remembered the better.

It was a great honour to have been asked by the President to propose this

vote of thanks, which, very appropriately, was to be seconded by Lieutenant-Colonel Moore Brabazon, the first Britisher to attain power-driven flight in this country.

Lieutenant-Colonel MOORE BRABAZON, seconding, said that the Master of Sempill had drawn attention to the fact that many of those present had listened to every Wilbur Wright Memorial Lecture that had been delivered. They were bound to confess that some had been better than others, but they were happy on this occasion in having heard a vivid lecture. As a politician he had been delighted to hear the tribute which Mr. Wimperis had paid to hot air. Frankly, he was beginning to lose confidence in it, but Mr. Wimperis had reassured him.

From the platform he had taken a great interest in the audience. He did not know their Reynolds number, but they were model listeners—ornamental, beautifully dressed, looking singularly intelligent and very attentive. That did them great credit. They, looking at the platform, and contemplating the craniums of those seated thereon, would realise that the Royal Aeronautical Society was a scientific body. Science was extremely fashionable. There was proceeding, in the columns of *The Times*, a discussion on physics, from the point of view of whether or not the universe was expanding. This had caused very much disquietude in the minds of many, and he had been asked what they were going to do with regard to slimming. They were told by the physicists that light was no longer a corpuscle, no longer a wave; they had to compromise in a wave packet. Whatever that was he did not know. The problems which interest them now were not the problems of the past, and there had been many acrimonious discussions in the past on points which would not interest them now. Some of these, he believed, had been settled for ever. There was one very old problem which he believed was going to be settled for ever. Many years ago people had discussed with great vehemence the problem as to how many fairies could dance on the point of a needle. Knowing the Society's President, Mr. Fairey, and having seen him dance, he maintained that only one could do such a thing. Thus one controversy was settled for ever.

Mr. Wimperis had raised points which would be settled in the future, and it was a pleasure to be able to second the vote of thanks to him for his admirable lecture.

The vote of thanks was carried with acclamation.

Mr. WIMPERIS, in a brief response, thanked the audience most cordially for the attention with which they had been good enough to listen to what he described as his poor effort, and for the vote of thanks accorded him. Having already occupied much of their time, no doubt he would be forgiven if he shared the general view that he should now sit down.

SUMMARY OF THE SOCIETY'S ACTIVITIES

DECEMBER, 1931—DECEMBER, 1932

The following places on permanent record in the Journal the notices which have appeared in the Monthly Notices inset in the Journal, and so summarises the Activities of the Society for the year.

President

The Council at their meeting on June 22nd, 1932, unanimously re-elected Mr. C. R. Fairey, M.B.E., F.R.Ae.S., as President for a third year (October, 1932—September, 1933), following the suspension of the Rule, at a Special General Meeting held on Thursday, June 9th, 1932, that no President may serve for more than two years in succession. The Council, in putting forward the proposed suspension of the rule, had in mind the re-election of Mr. Fairey, who has taken such a keen and practical interest in the welfare of the Society and has devoted an immense amount of his valuable time to the Society's affairs. Under Mr. Fairey's guidance the Society is making that steady progress which is leading to its whole future being placed on a firm basis and one can look forward to the certainty that when he lays down the reins of office he will have fulfilled, despite the great difficulties which are being faced from a financial point of view, his ambition to leave the Society in a stronger position than when he first became President.

Vice-Presidents

The following were elected Vice-Presidents of the Society for the year 1932-33, at the Council Meeting held on June 22nd, 1932:—

Professor L. Bairstow, C.B.E., F.R.S., F.R.Ae.S. (re-elected).
Air Marshal Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., F.R.Ae.S.
Mr. A. F. Sidgreaves, O.B.E.

Council

The following is the full Council for 1932-33:—

President:
Mr. C. R. Fairey, M.B.E., F.R.Ae.S.

Past-President:
Colonel the Master of Sempill, A.F.C., F.R.Ae.S.

Vice-Presidents:
Prof. L. Bairstow, C.B.E., F.R.S., F.R.Ae.S.
Air Marshal Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., F.R.Ae.S.
Mr. A. F. Sidgreaves, O.B.E.

Council:

Major T. M. Barlow, M.Sc., F.R.Ae.S.
Mr. Robert Blackburn, O.B.E., F.R.Ae.S.
Mr. Griffith Brewer, F.R.Ae.S.
Major G. P. Bulman, O.B.E., B.Sc., F.R.Ae.S.
Mr. R. S. Capon, O.B.E., B.A., F.R.Ae.S.
Mr. E. C. Gordon England, F.R.Ae.S.
Mr. W. S. Farren, M.B.E., F.R.Ae.S., M.I.Ae.E.
Mr. A. H. Hall, C.B.E., F.R.Ae.S.
Mr. M. Langley, A.M.I.Ae.E., A.M.Inst.N.A.
Mr. W. O. Manning, F.R.Ae.S.
Mr. R. K. Pierson, M.B.E., B.Sc., F.R.Ae.S.
Mr. D. R. Pye, M.A., F.R.Ae.S.
Mr. E. F. Relf, A.R.C.S., F.R.Ae.S.
Lieut.-Col F. C. Shelmerdine, C.I.E., O.B.E., A.F.R.Ae.S.
Mr. R. V. Southwell, M.A., F.R.S., F.R.Ae.S.
Mr. H. E. Wimperis, C.B.E., F.R.Ae.S.
Mr. R. McKinnon Wood, O.B.E., M.A., F.R.Ae.S.

Hon. Treasurer:
Major D. H. Kennedy, O.B.E., F.R.Ae.S.

Hon. Solicitor:
Mr. L. A. Wingfield, M.C., D.F.C., A.R.Ae.S.I.

Hon. Librarian:
Mr. J. E. Hodgson.

Hon. Accountant:
Mr. A. N. D. Smith, F.I.C.A.

Secretary and Editor:
Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Committees of Council

The following Committees of Council were appointed for 1932-33:—

Grading Committee:

Captain F. S. Barnwell, Mr. R. A. Bruce, Major G. P. Bulman, Mr. F. A. Bumpus, Mr. W. S. Farren, Lieut.-Col. L. F. R. Fell, Mr. A. Gouge, Captain F. T. Hill, Mr. R. J. Mitchell, Mr. W. P. Savage, the Master of Sempill, Prof. R. V. Southwell, Dr. H. C. Watts.

Finance Committee:

Captain P. D. Acland, Mr. Griffith Brewer, Mr. E. C. Gordon England, Mr. C. R. Fairey, Captain F. T. Hill, Mr. J. E. Hodgson, Major D. H. Kennedy, Captain A. G. Lamplugh, Mr. John Lord, Mr. F. R. Simms, Mr. A. N. D. Smith and Mr. Lawrence A. Wingfield.

Lectures Committee:

Prof. L. Bairstow, Major T. M. Barlow, Mr. M. L. Bramson, Major G. P. Bulman, Mr. R. S. Capon, Captain F. Entwistle, Mr. F. A. Foord, Mr. H. Glauert, Major F. M. Green, Captain G. T. R. Hill, Mr. H. B. Irving, Mr. M. Langley, Mr. R. K. Pierson, Mr. D. R. Pye, Mr. E. F. Relf, Mr. S. Scott-Hall and Mr. C. C. Walker.

Education and Examinations Committee:

Major T. M. Barlow, Prof. L. Bairstow, Mr. R. S. Capon, Mr. W. E. Dumbrill, Captain A. T. E. Eadon, Captain F. T. Hill, Prof. B. Mevill Jones, Mr. W. M. Page, Dr. N. A. V. Piercy, Mr. R. K. Pierson, Mr. D. R. Pye, Mr. W. P. Savage, Mr. H. T. Tizard, Captain G. S. Wilkinson and Mr. Lawrence A. Wingfield.

Medals and Awards Committee:

Major T. M. Barlow, Mr. Griffith Brewer, Air Marshal Sir H. R. M. Brooke-Popham, Major J. S. Buchanan, Mr. A. H. R. Fedden, Group Captain G. B. Hynes, Mr. W. O. Manning, Sir A. Verdon-Roe, Mr. G. R. Volkert, Mr. C. C. Walker, Mr. H. E. Wimperis, Mr. Lawrence A. Wingfield and Mr. R. McKinnon Wood.

Joint Standing Committee with the Society of British Aircraft Constructors and the Royal Aero Club:

Prof. L. Bairstow, the Master of Sempill and Lieut.-Col. F. C. Shelmerdine.

Representatives on Other Bodies.

British Engineering Standards Association Aircraft Committee: Major R. H. Mayo and Dr. H. C. Watts.

Advisory Council of the Science Museum: Colonel the Master of Sempill.

National Central Library: Mr. J. E. Hodgson.

Students' Section: Mr. G. W. Mullett (Hon. Secretary) for first half of year; Mr. C. H. Jackson (Hon. Secretary) second half of year.

Association of Special Libraries and Information Bureau: Mr. J. E. Hodgson (Hon. Librarian).

Advisory Committee on Aeronautical Education of the Imperial College: Mr. C. R. Fairey.

B.E.S.A. Committee on Symbols and Abbreviations Used in Engineering: Major A. R. Low.

Lloyds Aviation Committee: Lieut.-Col. J. T. C. Moore-Brabazon.

British Corporation Register of Shipping and Aircraft, Aviation Committee: Colonel the Master of Sempill.

Seagrave Memorial Fund Committees: Mr. C. R. Fairey.

British Gliding Association: Council: Colonel the Master of Sempill. Technical Committee: Capt. J. L. Pritchard, Capt. F. T. Hill.

Elections

The following were elected members of the Society in the grades indicated on 15th December, 1931:—

Associate Fellows.—Anath Bandhu Ray, Eugene Wieser (from Student).

Associate Member.—George Thomas Harvey Pack.

Associates.—Hugh Thornley Andrews, Noel William Nicholls, Christopher Stainbank Staniland, John Gordon Frederick Ward.

Students.—Charles Martyn Collard, Ronald W. F. Farthing, R. J. Schmidt, John Leslie Watkins.

Companions.—William Malcolm Neville (re-elected), Alfred Horace Elkington (from Student), Frank John Murdoch, Howard Arthur Wills, Miss Delphine Reynolds.

On January 12th, 1932:—

Associate Fellows.—William Henry Hambrook, Colin Campbell Mitchell, William Grenville Parsonson, Percy Brooksbank Walker.

Associate Member.—Augustus Alfred Ward Barron (re-elected).

Students.—William Read Bendall, Charles Gordon Knight Browne, James William Diaper, Michael Chitty Clendon Haycraft.

Companion.—Athol Rudolph Mayhill.

On February 16th, 1932:—

Associate Fellows.—Donald Lambert Brown, Arthur Stanley Hartshorn, Percy Bertram Humphrey, Theodore Neuman McEvoy (from Student), Krishan Lal Puri.

Associate Member.—Voldemar Post.

Associates.—Harry Arthur Collins, William Howard Garland, Sidney George Nash, Walter Orsborn, Cyril Protheroe, Norman Lynes Walker.

Students.—Douglas Gerald Seafield Grant, Robert Lee Hayes, John Walter Herrick, John Watson Leach, John Kannerleigh Barnett Lee, Arthur Geoffrey Stafford Northcote, Cyril Arthur Osborn, Maxwell Allan Pitts, David Stewart, George Arthur Vigil.

Companions.—Charles John Adamson (from Student), Frederick Walter Rudolph Leistikow.

On March 15th, 1932:—

Member.—Edgar Wikner Percival (from Associate Member).

Associate Fellows.—Walter Richard Jones, Lieut.-Commander the Hon. John Michael Southwell (from Associate), William Lyall Taylor, Hugh Frederick Vessey, Daniel Howell Williams, Richard Zdanowich.

Associate Member.—Krishan Lal Puri.

Associates.—William Guthrie Bertram Clark, Tsaitzu Teshu Mar.

Students.—Albert Godfrey Gooch, William Perrin Lewis, Stanley Alderson Powell-Jones.

Companion.—Kenneth Franklin Tupper (From Student).

On April 12th, 1932:—

Fellows (from Assoc. Fellows).—George Purvis Bulman, Sydney Camm, Arthur Davenport, Eric Cecil Gordon England, Harry Mason Garner, Arthur Henry Hall, Henry Bernon Howard, Ernest John Herbert Lynam, Harold William Sydney Outram, Andrew Robertson, Herbert Lawrence Stevens, George Rudolph Volkert.

Assoc. Fellows.—Edmund Neil Boileau Bentley (from Assoc. M.), Hugh Latimer Dryden, Cyril Frank Uwins.

Associates.—Harbans Singh Bawa, Gerard Leslie Gandy, Edward Dixie Keen, Leslie Harvey Bowes Pemberton.

Students.—Leonard Hugh Cooke, Hermann Andrew Hutler, Ivan Grant Murray.

Companion.—Richard Charles London (from Student).

On May 10th, 1932:—

Fellows.—Leonard Charles Bygrave (from Assoc. Fellow), Juan de la Cierva (from Assoc. Fellow), William Lewis Cowley (from Member), Leslie George Frise (from Assoc. Fellow), Henry Braid Irving (from Assoc. Fellow), Christopher Noel Hunter Lock (from Assoc. Fellow).

Associate Fellows.—Ernest W iam Bliss, Vivian Gwilym Jones (from Associate), Air Commodore Duncan LeGeyt Pitcher.

Associate Member.—Alfred Charles Morris Jackaman.

Associate.—Frederick George Spicer.

Students.—Cyril Leonard Bessey, Hubert William Jordan Brittlebank, Maurice Herrod-Hempsall, John Cecil Longman, Damodar Narhar Thakar.

Companion.—John Townend.

On June 22nd, 1932:—

Fellows (from Assoc. Fellows).—Thomas Wigston Kinglake Clarke, Harold Grinsted.

Associate Fellows.—Alfred Gordon Berg (from Companion), William Evelyn Patrick Johnson, Kenneth Wilson Marshall (from Student), Albert Cyril Shaw (from Student), Richard Pratt Targett-Adams, Harry Barlow Walker.

Associate Member.—Robert Ashton.

Associate.—Francis Guy Borcham.

Students.—Michael O'Bryen Shute Barrington, Hector Leo Cruickshank, Anil Chandra Mitter, Peter Herbert Rayner, Norman Peter Reason, Gursharn Singh, Kenneth Elliott Walters, Alexander Robert Wright.

Companion.—Frederick Edward Guest.

On September 20th, 1932:—

Associate Fellows.—John Falk Arnold, Owen Wilson Clapp, John Freeman Cuss (from Student), John Talbot Dyment (from Associate), Robert McVie (from Student), Sures Chandra Sen, Robert Ashinhurst Bird Stone.

Associate Members.—Arthur Edward Bingham (from Assoc.), Eric Powell.

Associates.—Harry Frederick Baker (Aust. Br.), George Norman Beckmann (from Student), Norman Bull, Bernard Elliott Dunkley, Christopher Robson Elgie, Robert Haigh, Arthur Leslie Haslam, William Joseph Hickey (from Student), Basil Richard Hunter Hicks, James Carl de Hoedt, Nelson Jerram, Frederick Charles Keating, William Albert Charles Kingham, John Vanston Roberts, Edwin Shipley, Thomas Frederick Wookey.

Students.—Erach Sorabji Godivala, John Chevalier Hardman, John Reginald Henderson, Stuart MacLaurin, Khubchand Kundanmal Ramchandani, Atam Sarup, Edmund Joseph Weiss.

Companion.—Robert Rule Graham.

On October 18th, 1932:—

Member.—Reginald Herbert Stocken (from Associate Member).

Associate Fellows.—Harry Edwin Fozard, Phiroze Pestonji Nazir.

Associate Member.—John Gordon Hopcraft.

Associates.—Hugh Granville Loch, Geoffrey Tremayne Rodd, Harry Webb.

Students.—Rana Denis Shamsher Jung Bahadur, Ernest George Barber, Eric Debnam Baker, Robert Edmund Godefroy Brittain, Denis Osbert Bustard, Frederick George Ronald Cook, Roland Dixon, Leonard James Folkestone, Kenneth Bryan Gilmore, Eric Stanley Macartney Iredell, Robert Lang Lickley, Jacques Lorentz, Murzban Ruttonjee Mandviwalla, Victor Ronald Mumford, Walter Tye.

Companions.—Richard Humble, Eustace B. Robinson, Thomas Neville Stack.

On 15th November, 1932:—

Fellow.—Herbert Sutton (from Associate Fellow).

Member.—N. Nicholas-Olcenovitch (re-election).

Associate Fellows.—Joseph William Hay Barrett (from Associate), Eugene James Earle (from Student), Edward Fothergill Elderton.

Associate Member.—William David Sherriff (from Student).

Associates.—Donald Cameron Douglas, Maurice William Hullcoop, Richard Ernest Sidney Quincey, Stephen Frank Wilkinson.

Students.—Duncan Scott Bald, Guy Thornton Walpole Champneys, Walter Henry Curtis, Alec Arthur Fletcher, Clifford Douglas Graham, Thomas Stanley Harker, Geoffrey Patrick Hebden, Cecil Reuben Johnson, Philip Thomas Knott, Aendrea James Fotheringham McDonald, Roy George Parsons, Charles Willis Prower, Aurel A. Samoil, Mphsen Shehab-El-Din.

Annual General Meeting

The Annual General Meeting of the Society was held on 31st March, 1932, in the Library of the Society.

Present:—Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President), in the chair. *Council:* Mr. Griffith Brewer, F.R.Ae.S. (Vice-President), Messrs. P. D. Acland, T. M. Barlow, G. P. Bulman, D. H. Kennedy (Honorary Treasurer), M. Langley, W. O. Manning and L. A. Wingfield (Honorary Solicitor). *Ordinary Members:* Flight Lieut. R. E. H. Allen, Mr. G. N. Ashcroft, Mr. C. G. Brewer, Mr. R. L. Carter, Wing Commander T. R. Cave-Browne-Cave, Mr. F. J. Cleveland, Capt. A. T. E. Eadon, Mr. H. W. Franklin, Group Capt. G. B. Hynes, Flight Lieut. R. Chevalier Preston and Lieut. Comdr. the Hon. J. M. Southwell.

Captain J. Laurence Pritchard, Secretary. Staff: Miss Jarvis, Miss Todd and Miss Voice.

The Secretary read the notice convening the meeting.

The President, in opening the meeting, reviewed the year's activities as detailed in the Council's Annual Report, published in the Journal of March, 1932. He laid stress upon the fact that the year under review had been one of exceptional financial depression, but even so the Society had been able to maintain a solvent position, and the increase of the Endowment Fund had been greater during this particular period than at any other time. The President impressed upon those present, however, the great necessity for keeping the fund constantly in mind, as it was of vital importance that the Society should eventually be able to maintain an independent financial position. In the meantime the Council wished to express their cordial thanks and appreciation of the grants received from the Air Ministry, the Society of British Aircraft Constructors and the Society of Motor Manufacturers and Traders.

The President drew attention to many encouraging features in the Annual Report, including a definitely increasing membership, a series of valuable and well attended lectures, and a flourishing Students' Section. In addition the Council had to report highly successful results of the scheme for lectures before the Public Schools, and in this connection very cordial thanks were due to Mr. W. O. Manning for the great help he had given in inaugurating the scheme.

The President paid a special tribute to the flourishing work of the various Branches of the Society and to the Honorary Officers. Major D. H. Kennedy, the Chairman of the Finance Committee, had been largely instrumental in directing the Society's finances so as to ensure the maximum efficiency with the minimum expenditure. Mr. J. E. Hodgson had again given freely of his knowledge and experience as Honorary Librarian. Mr. Lawrence Wingfield had given invaluable help to the Society on all legal questions, and particularly in the formation of Aeronautical Trusts, Ltd., and new Articles of Association for Aerial Science, Ltd., all of which had involved a considerable amount of time and work. To Mr. Norman Smith, the Honorary Accountant, the Council owed a deep debt of gratitude, and particularly for his help in regard to Income Tax problems.

After commenting on the efficiency of the staff, the President paid a striking tribute to the Secretary, Captain J. Laurence Pritchard, to whose ability, energy and enthusiasm the Society owed a deep debt of gratitude. In fact, he could be considered the mainstay of the Society. The increasing interest and importance of the Journal and its value as an advertising medium was only one instance of the outstanding merits of the Secretary and his staff, and the Council wished to place on record their great appreciation.

The President concluded his speech by thanking the members of Council and Committees for their hard work during the year.

The following resolution was moved by Flight Lieut. Allen:—

> "That the proposed alterations to the rules for Membership, Associate Fellowship, Associate Membership and Associateship, as printed in the Agenda of the Annual General Meeting of 31st March, 1932, be accepted."

The resolution was seconded by Capt. A. T. E. Eadon and carried unanimously.

Messrs. Acland, Barlow and Carter were appointed scrutineers for the ballot for election of new Members of Council for 1932-34.

As a result of the ballot the following were elected to fill the vacancies on the Council:—

> Professor L. Bairstow, Air Marshal Sir H. R. M. Brooke-Popham, Major G. P. Bulman, Mr. R. S. Capon, Mr. E. C. Gordon England, Mr. W. S. Farren, Mr. R. K. Pierson, Mr. D. R. Pye, Mr. E. F. Relf, and Professor R. V. Southwell.

On the proposal of Major Kennedy, seconded by Major Barlow, Messrs. Price, Waterhouse and Co. were elected as Auditors for Aerial Science, Ltd., and Aeronautical Trusts, Ltd., for the ensuing year.

Major Kennedy raised the question as to whether it would be possible to delete the clause in Rule 86 which was passed by the previous Annual General Meeting, to the effect that Council members could not continue in office for more than four years in succession. The matter was referred to the next meeting of Council.

The business of the meeting being concluded, Mr. Wingfield proposed a cordial vote of thanks to the Chairman, Mr. Fairey, who, as President of the Society, had more than upheld the traditions of his predecessors. When Mr. Fairey took office he had referred with characteristic modesty to the difficulty he

felt in following such a President as the Master of Sempill. Mr. Wingfield remarked that under the rules no future President could serve for such a long period as Colonel Sempill had done, but during the first year of his office Mr. Fairey had in every way fulfilled the hopes that were entertained of him in carrying on the good work, not the least part of which was the considerable financial advancement of the Society. It was due to Mr. Fairey's generosity in giving the original £100 that the Council were able to present the Endowment Fund appeal in such a way as to bring in no less than £500 during the year. This was all the more gratifying in view of the general depression during that period, and the Council hoped that the appeal would continue to bring in still more and more as times improved. Mr. Wingfield further referred to the personal generosity of the President in entertaining distinguished visitors and lecturers from abroad, and in meeting the deficit on the Wilbur Wright Lecture and Conversazione. The President had, in fact, gone out of his way to be generous, and in a general way had done all he could in the direction of personal interviews and negotiations, to back up the Council and the Society. To have such strong support from the President in all these ways was particularly appreciated by those, such as secretaries and other officers, who had to run any society or institution, as without such support their work would be unavailing.

Captain Acland seconded the vote of thanks, and the President expressed his great appreciation of all that had been said. He had felt it a great honour and pleasure to be President of the Royal Aeronautical Society. He could have wished times had been more propitious during his term of office, but he hoped it would not be long before the Society was in a sound financial position. In his office as President he had been helped considerably by the Council and officers, and he felt sure that when his time was up the tradition would be carried forward with the same hearty co-operation.

Lectures

The following Lectures were read before the Society in 1932:—

January 14th.—" Interference." Mr. E. Ower, F.R.Ae.S.

January 28th.—" Some Factors Affecting Range, with Special Reference to Height." Mr. A. E. Woodward-Nutt, B.A., A.F.R.Ae.S., and Flight Lieut. A. F. Scroggs.

February 4th.—" The Organisation of Air Routes and Aerodromes for Night Flying." Dr. R. Benkendorff.

February 11th.—" Tests of Aircraft Components." Mr. I. J. Gerard, M.Sc., A.F.R.Ae.S.

February 25th.—" Catapults." Mr. P. Salmon.

March 1st.—" Diesel Engines for Road Transport." Mr. C. B. Dicksee. (Joint Meeting with the Institution of Automobile Engineers.)

April 7th.—" Wing Construction." Mr. H. J. Stieger, D.I.C., A.F.R.Ae.S.

April 14th.—" Aero Engine Accessories." Mr. W. L. Taylor.

April 21st.—" Air Port Development." Mr. Nigel Norman, B.A., A.F.R.Ae.S. (Joint Meeting with the Institute of Transport.)

May 5th.—Group Captain J. E. A. Baldwin, D.S.O., O.B.E., " The Training of Pilots and Instructors."

May 26th.—Mr. H. E. Wimperis, C.B.E., F.R.Ae.S., the Twentieth Wilbur Wright Memorial Lecture, " New Methods of Research in Aeronautics."

October 6th.—Captain N. MacMillan, M.C., A.F.C., A.F.R.Ae.S., " Air Navigation." (Joint Lecture with the Guild of Air Pilots.)

October 20th.—Flight Lieutenant W. G. Pudney, " Flying Conditions on the West Coast of Africa."

October 27th.—Mr. F. Fellowes, " Aeroplane Covers and Wheels." (Joint Meeting with Inst. of Rubber Industry.)

November 3rd.—H. G. Travers, D.S.C., "Civil Primary Training."
November 10th.—D. L. Hollis Williams, B.Sc., A.F.R.Ae.S., "Airscrew Design."
December 1st.—A. Fage, A.R.C.Sc., F.R.Ae.S., "The Behaviour of Fluids in Turbulent Motion."
December 8th.—Lieut. J. S. A. Salt, R.E., "Air Survey."

The following is a list of the principal Lectures before the Branches:—

January 7th.—Lecture before the Yeovil Branch by Captain J. L. Pritchard, Hon.F.R.Ae.S., on "Ten Years' Progress(?) in Aeronautics."
January 8th.—Lecture before the Hull and Leeds Branch by Major R. H. S. Mealing, A.R.Ae.S.I., on "The Progress and Prospects of Civil Aviation."
January 14th.—Lecture before the Gloucester and Cheltenham Branch by Mr. I. J. Gerrard, M.Sc., A.F.R.Ae.S., on "Mechanical Testing."
January 14th.—Lecture before the Yeovil Branch by Mr. Tresilian, of Rolls-Royce, Ltd., on "Rolls-Royce Schneider Engines."
January 19th.—Lecture before the Bristol Branch by Mr. F. Handley Page, C.B.E., F.R.Ae.S., on "Some View Points in the Design of Modern Commercial Aircraft."
January 21st.—Lecture before the Gloucester and Cheltenham Branch by Captain C. D. Barnard on "Civil Aviation."
January 21st.—Lecture before the Yeovil Branch by Mr. H. J. Penrose, A.F.R.Ae.S., on "A Visit to South America."
January 28th.—Lecture before the Yeovil Branch by Senor J. de la Cierva on "The Autogiro."
February 4th.—Lecture before the Gloucester and Cheltenham Branch by Squadron Leader W. R. D. Acland, D.F.C., A.F.C., on "Deck Landing."
February 4th.—Lecture before the Yeovil Branch by Mr. Hodgson, A.I.D., on "Engine Maintenance."
February 11th.—Lecture before the Gloucester and Cheltenham Branch by a representative of the Marconi Co.
February 11th.—Lecture before the Yeovil Branch by Mr. W. Widgery, on "What Model Tests Teach Us."
February 12th.—Lecture before the Hull and Leeds Branch by Squadron Leader H. W. McKenna, D.C.M., on "The Work of the Armament and Aeroplane Experimental Establishment at Martlesham Heath."
February 18th.—Lecture before the Gloucester and Cheltenham Branch by Mr. L. Martin on "Workshop Practice."
February 18th.—Lecture before the Yeovil Branch by Major C. J. Stewart, O.B.E., F.R.Ae.S., on "Further Developments in Aircraft Instruments."
February 25th.—Lecture before the Yeovil Branch by Flight Lieut. E. A. Healy, on "The Wapiti in England."
March 3rd.—Lecture before the Yeovil Branch by Mr. R. A. Denne, of Blakeborough & Sons, Ltd.
March 10th.—Lecture before the Yeovil Branch by Squadron Leader H. W. McKenna, D.C.M., on "The Work of the Armament and Aeroplane Experimental Establishment at Martlesham Heath."
September 29th.—Lecture before the Gloucester and Cheltenham Branch by G. H. Dowty, A.F.R.Ae.S., M.I.Ae.E., on "Aircraft Undercarriages."
October 20th.—Lecture before the Yeovil Branch by Mr. H. B. Taylor, A.F.R.Ae.S., on "Compression-Ignition Aero Engines."
October 27th.—Lecture before the Gloucester and Cheltenham Branch by Mr. H. J. Pollard, Wh. Ex., A.F.R.Ae.S.

November 3rd.—Lecture before the Yeovil Branch by Captain F. Entwistle, B.Sc., on "Meteorology."

November 16th.—Lecture before the Manchester Branch by Mr. Yuill, on "Flying Training."

November 17th.—Lecture before the Yeovil Branch by Mr. Bainbridge, of the British Oxygen Co., on "Electric Welding."

November 24th.—Lecture before the Gloucester and Cheltenham Branch by Mr. C. B. Collins, A.R.Ae.S.I., on "Civil Aviation."

December 1st.—Lecture before Yeovil Branch by Mr. D. L. Hollis Williams, of the Fairey Aviation Company, on "Airscrew Development."

December 12th.—Lecture before Manchester Branch by Captain J. Laurence Pritchard, Hon.F.R.Ae.S., on "The Uses of the Aeroplane."

December 15th.—Lecture before Yeovil Branch by Lieut. R. R. Graham, R.N., on "Some Secrets of Bird Flight."

December 20th.—Lecture before the Gloucester and Cheltenham Branch by Mr. H. L. Stevens, B.A., F.R.Ae.S., on "Flying Controls."

Students' Section

The following Lectures were read before the Students' Section during the year:—

February 2nd.—Lecture before the Students' Section by Mr. S. G. Hooker, "Aerodynamics of Streamlining."

February 29th.—"The Fundamental Principles of Aircraft Stressing," by Mr. D. Hay Surgeoner. Chairman, Dr. H. F. Winny, B.Sc.

March 8th.—"An Introduction to Aircraft Performance Calculations," by Mr. S. D. Davies, B.Sc. Chairman, Dr. H. F. Winny, B.Sc.

March 17th.—"Some Notes on the Design of Aeroplane Control Surfaces and Control Systems," by Mr. W. F. Dowsett. Chairman, Mr. H. E. Wimperis, C.B.E., M.A., F.R.Ae.S., Vice-President of the Society.

April 19th.—"Torsion of Cylindrical Bars of Non-circular Section," by Mr. G. W. Mullett, Wh. Sch., D.I.C. Chairman, Dr. H. Roxbee-Cox, B.Sc., D.I.C., A.F.R.Ae.S.

May 24th.—"Carburettors," by Mr. G. A. Vigil, B.Eng. Chairman, Mr. D. R. Pye, M.A., F.R.Ae.S., Member of Council.

The average attendance at the lectures was twenty.

In addition to the above lectures, visits were paid to Vickers (Aviation) Ltd. at Weybridge on April 23rd, 1932, at which the attendance was sixty-five; and to the Aerodynamics Department of the National Physical Laboratory at Teddington on July 2nd, 1932, at which the attendance was thirty-six. These two visits were very great successes and it is hoped to arrange a number more for next session.

Tuesday, November 22nd.—Inaugural Address before the Students' Section by Professor T. R. Cave-Browne-Cave, C.B.E., F.R.Ae.S., M.I.Mech.E., A.M.Inst.N.A., on "The Aeronautical Graduate's Next Step." Major T. M. Barlow, M.Sc., F.R.Ae.S., in the chair.

The following rules have been drafted by the Students' Committee. The Students' Section of the Society has rapidly increased in importance in the last few years, and the Council wish to impress upon every student the importance of supporting their section, not only by attending all students' meetings, but by contributing papers and suggestions and helping the Committee in every way in their power. The Council are keenly anxious that the Students' Section shall become of real value to all those who are beginning in aeronautics. It is upon them that the future of aviation depends and it is to them that the Council look for the future prosperity and power of the Society.

DRAFT RULES.

1. *Title and Constitution.*

(*a*) The name of the Section shall be "The Students' Section, The Royal Aeronautical Society," and its correct abbreviated title "Stud.Sec.R.Ae.S.I."

(*b*) The Section shall consist of every Student Member of the Society.

2. *Objects.*

(*a*) To secure that the best use is made of the special privileges arranged by the Council of the Society for the benefit of Student Members.

(*b*) To encourage Students in the preparation of papers for publication in the JOURNAL of the Society. To encourage such papers to be read and discussed before the Section and to further the competition for the Society's prizes.

(*c*) To promote knowledge in all branches of aeronautical science and to assist the successful advancement of Students to the higher technical grades of the Society.

(*d*) And in any way to further the interests of Students.

3. *Activities.*

(*a*) The Session shall commence in October.

(*b*) There shall be one Annual General Meeting at the commencement of each Session to discuss the affairs of the Section.

(*c*) The Inaugural Address of the Session shall be given by a member of the Parent Body and it shall be followed by a discussion.

(*d*) The Section shall meet at regular intervals throughout the Session when Papers by Students shall be read and discussed.

(*e*) There shall be properly arranged visits to places of interest.

4. *Management.*

(*a*) The affairs of the Section shall be managed by a Committee of Student Officers, consisting of a Chairman, a Vice-Chairman, a Secretary and a group of six elected members.

(*b*) This Committee shall consist of representatives of adjacent aeronautical works and colleges.

(*c*) All Officers shall be elected by ballot at the Annual General Meeting and their term of office shall be one year, but they shall be open for immediate re-election.

(*d*) The Committee shall have the power to fill any casual vacancy which may occur in their number during the year.

(*e*) The Student Chairman shall be in the Chair at all Committee Meetings.

(*f*) The Quorum of the Committee shall be four.

(*g*) All resignations from Office shall be in writing.

5. *Meetings.*

(*a*) At all Meetings, except the Annual General Meeting, the Chairman of the evening shall be a member of the Parent Body and he shall be introduced to the Section by the Student Chairman.

(*b*) The Chair shall be taken by the Student Chairman at the Annual General Meeting.

(*c*) In the absence of the Chairman, the Vice-Chairman shall be in the chair.

(*d*) The Minutes of a Meeting shall be recorded by the Secretary and they shall be approved at the next Meeting before being signed by the Student Chairman.

(*e*) A record of attendances shall be kept of all Meetings. Visitors may be introduced by Members at all Meetings except the Annual General one. Such a visitor *must* sign the Visitors' Book.

(*f*) A report of the activities of the Students' Section shall be made by the Secretary of the Students' Section, in writing, at the end of each Session, to the Secretary of the Society.

(*g*) Nothing in the above rules nor in their interpretation shall be taken as abrogating any of the rules of the Royal Aeronautical Society.

The Committee shall have the power to interpret these Rules in case of dispute of their meaning or effect.

The Committee have decided to arrange a series of elementary lectures or papers of an informal nature dealing essentially with the first principles of aeronautics. The lectures are to be given by Student members.

OFFICERS, 1932-1933.

Chairman: Mr. J. N. Richmond.

Vice-Chairman: Mr. S. D. Davies, B.Sc.

Secretary: Mr. C. H. Jackson, A.C.G.I.

Committee: Messrs. J. P. Bertinat, V. A. R. French, H. G. Stokes, R. W. F. Farthing, G. W. Mullett, G. P. King, R. J. Schmidt.

School Lectures

The series of Public Schools Lectures, which were inaugurated in 1931, proved so successful that it has been continued this year. The first schools' lecture dealt with the "History of the Aeroplane," mainly from the point of view of British aircraft development. The lecture for 1932 is concerned with "The Uses of the Aeroplane," and is illustrated with a special series of some forty slides.

Many members of the Society have helped in the delivery of these lectures and the Council wish to express their thanks to them for the time and trouble they have given. The Council are convinced that these lectures are of the greatest possible value in stimulating an interest in aircraft among those who will have a great influence in the development of aviation during the next few years. Since the lectures have been started over 25,000 Public School boys have attended them.

Lectures before Public Schools, Etc.

January 18th.—St. Olave's School. Mr. W. O. Manning, F.R.Ae.S.

January 22nd.—King's College School, Wimbledon Common. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

January 23rd.—Elstree School. Comdr. L. D. Mackintosh, D.S.C., A.F.R.Ae.S., R.N.

January 25th.—Nottingham High School. Mr. W. P. Savage, A.F.R.Ae.S.

February 2nd.—Ellerslie Hall School, Cricklewood, and Mara Road School, Cricklewood. Mr. M. Lewin, A.F.R.Ae.S.

February 4th.—Ryde Grammar School. Mr. T. A. S. Lloyd, A.R.Ae.S.I.

February 5th.—King's School, Ely. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

February 8th.—King Edward's School, Southampton. Professor T. R. Cave-Browne-Cave, C.B.E., F.R.Ae.S.

February 11th.—King's College Engineering Society. Mr. C. E. Hoddle, Stud.R.Ae.S.I.

February 11th.—Alderman Newton's School, Leicester. Flight Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.

February 12th.—Wyggeston School, Leicester. Flight Lieut. A. Hewitt.

February 12th.—College of Technology, Leicester. Flight Lieut. Hewitt.

February 15th.—Ipswich Guild. Mr. S. Scott-Hall, M.Sc., D.I.C., A.F.R.Ae.S.

February 17th.—Cranbrook School. Mr. J. E. Hodgson, Hon. Librarian.
February 17th.—Bradfield College. Mr. H. L. Stevens, B.A., F.R.Ae.S.
February 19th.—Cranleigh School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
February 19th.—Rutherford College. Mr. John Bell, A.R.Ae.S.I.
February 20th.—Royal Masonic School, Bushey. Flight Lieut. J. B. H. Rogers.
February 23rd.—Bruton School. Mr. H. J. Penrose, A.F.R.Ae.S.
February 23rd.—Wallasey Grammar School. Lieut.-Col J. T. C. Moore-Brabazon, M.C., M.P., F.R.Ae.S.
February 23rd.—Epsom College. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
February 27th.—Berkhamsted School. Capt. C. H. Latimer Needham, M.Sc., F.R.Ae.S.
February 27th.—Eastbourne College. Mr. S. Scott-Hall, M.Sc., D.I.C., A.F.R.Ae.S.
February 29th.—Royal Grammar School, High Wycombe. Major D. H. Kennedy, O.B.E., F.R.Ae.S.
March 2nd.—Brentwood School. Flight Lieut. R. E. H. Allen, M.I.Ae.E., R.A.F.
March 3rd.—Durham School. Mr. E. G. Richardson, D.Sc., Ph.D., Comp.R.Ae.S.I.
March 5th.—Reading School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
March 8th.—Chester-le-Street and District Radio Association. Mr. John Bell, A.R.Ae.S.I.
March 9th.—Sherborne School. Mr. Robert Blackburn, O.B.E., F.R.Ae.S., M.I.Ae.E.
March 12th.—Dean Close School, Cheltenham. Flight Lieut. R. E. H. Allen, M.I.Ae.E., R.A.F.
March 17th.—Royal Grammar School, Newcastle-on-Tyne. Mr. John Bell, A.R.Ae.S.I.
March 24th.—Technical College, Lincoln. Mr. J. T. Morton, A.F.R.Ae.S.
March 26th.—Malvern College. Mr. H. P. Folland, M.B.E., F.R.Ae.S., M.I.Ae.E.
April 13th.—Paddington Branch, Junior Imperial League. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
May 22nd.—Marlborough College. Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President).
October 1st.—Weymouth College. Capt. A. S. Keep.
October 5th.—Cranbrook School. Mr. J. E. Hodgson, Hon. Librarian.
October 5th.—Brentwood School. Flight Lieut. R. E. H. Allen, M.I.Ae.E., R.A.F.
October 7th.—King's School, Ely. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
October 8th.—Hurstpierpoint College. Capt. J. Laurence Pritchard.
October 10th.—Royal Grammar School, Newcastle-on-Tyne. Mr. John Bell, A.R.Ae.S.I.
October 11th.—Hull Grammar School. Mr. H. V. Whiting, A.R.Ae.S.I.
October 14th.—Rutherford College. Mr. John Bell, A.R.Ae.S.I.
October 14th.—The Foremen's Mutual Benefit Society. Capt. J. Laurence Pritchard, Hon. F.R.Ae.S.
October 15th.—Haileybury College. Capt. J. Laurence Pritchard.
October 24th.—Felsted School. Capt. J. Laurence Pritchard.
October 27th.—Sherborne School. Mr. Robert Blackburn, O.B.E., F.R.Ae.S., M.I.Ae.E.
October 28th.—Warwick School. Mr. F. Radcliffe, B.Sc., A.R.Ae.S.I.

October 29th.—Stamford School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
November 1st.—Beaumont College. Mr. H. B. Wyn-Evans, M.B.E., R.C.N.C., A.F.R.Ae.S.
November 1st.—Mostyn House School. Flight Lieut. N. Comper, A.F.R.Ae.S.
November 2nd.—Leighton Park School, Reading. Major D. H. Kennedy, O.B.E., F.R.Ae.S.
November 3rd.—Hull Aero Club. Flight Lieut. N. Comper, A.F.R.Ae.S.
November 4th.—City of Oxford School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
November 4th.—Sutton Valence School. Mr. J. E. Hodgson, Hon. Librarian.
November 5th.—Bedales School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
November 7th.—Hillingdon Boys' School. Mr. J. T. Morton, A.F.R.Ae.S.
November 8th.—Ampleforth College. Mr. G. C. F. Ely, of the Blackburn Aeroplane and Motor Co., Ltd.
November 11th.—Dover College. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
November 14th.—St. Olave's School. Mr. W. O. Manning, F.R.Ae.S.
November 14th.—Royal Grammar School, Worcester. Mr. F. Radcliffe, B.Sc., A.R.Ae.S.I.
November 16th.—Chesham School. Capt. A. B. Fanstone, A.F.C., M.A., A.F.R.Ae.S.
November 17th.—Ryde Grammar School. Mr. T. A. S. Lloyd, Comp.R.Ae.S.I.
November 18th.—King's College School, Wimbledon Common. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
November 18th.—Houghton-le-Spring Secondary School. Mr. John Bell, A.R.Ae.S.I.
November 18th.—King's School, Rochester. Mr. C. P. Lipscomb, Wh. Ex., A.F.R.Ae.S.
November 19th.—Lecture in the Leicester Museum. Flight Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.
November 19th.—Stowe School. Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President).
November 21st.—King's School, Canterbury. Mr. J. E. Hodgson, Hon. Librarian.
November 21st.—Lecture before Imperial Chemical Industries, Billingham, by the Master of Sempill, A.F.C., F.R.Ae.S. (Immediate Past-President).
November 22nd.—St. Paul's School, Kensington. Mr. W. O. Manning, F.R.Ae.S.
November 22nd.—Uppingham School. Flight Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.
November 23rd.—Alderman Newton's School, Leicester. Flight Lieut. C. W. Hewitt.
November 23rd.—Leeds Grammar School. The Blackburn Aeroplane and Motor Co., Ltd., Representative.
November 24th.—Bonar Law School, Ashridge. The Master of Sempill, A.F.C., A.F.C., F.R.Ae.S. (Immediate Past-President).
November 24th.—Manchester Grammar School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
November 24th.—Harrow School. Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President).
November 25th.—Balshaw's Grammar School, Leyland. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

November 25th.—Eton College. The Master of Sempill, A.F.C., F.R.Ae.S. (Immediate Past-President).
November 25th.—Wyggeston School. Flight Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.
November 25th.—Haberdasher Aske's Hatcham School. Mr. M. L. Bramson, A.C.G.I., F.R.Ae.S.
November 28th.—Cambridge and County High School. Capt. J. Laurence Pritchard, Hon. F.R.Ae.S.
December 1st.—Imperial Service College. Mr. H. B. Wyn-Evans, M.B.E., R.C.N.C., A.F.R.Ae.S.
December 2nd.—Merchant Taylors' School. Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President).
December 2nd.—Willaston School, Nantwich. Flight Lieut. N. Comper, A.F.R.Ae.S.
December 3rd.—Dean Close School, Cheltenham. Flight Lieut. R. E. H. Allen, M.I.Ae.E., R.A.F.
December 3rd.—Leys School, Cambridge. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
December 5th.—King Edward VIth School, Southampton. Professor T. R. Cave-Browne-Cave, C.B.E., F.R.Ae.S.
December 5th.—Newcastle-under-Lyme High School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
December 8th.—Peter Symond's School, Winchester. Professor T. R. Cave-Browne-Cave, C.B.E., F.R.Ae.S.
December 9th.—Framlingham College. Mr. S. Scott-Hall, M.Sc., D.I.C., A.F.R.Ae.S.
December 9th.—City of London Freemen's School. Mr. N. A. C. Champion, A.M.I.Ae.E.
December 10th.—Caterham School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
December 15th.—Borough Polytechnic Engineering Society. Mr. D. Hay Surgeoner, Stud.R.Ae.S.I.
December 16th.—Northampton Town and County School. Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.
December 16th.—Toc H, St. Austell Group. Flt.-Lt. P. Phillips, D.F.C., Comp.R.Ae.S.I.

Wilbur Wright Memorial Lecture

The Twentieth Wilbur Wright Memorial Lecture was delivered on May 26th, 1932, by Mr. H. E. Wimperis, C.B.E., F.R.Ae.S., Vice-President, on "New Methods of Research in Aeronautics," before a distinguished audience. The lecture was preceded by a Council Dinner and followed by a reception and Conversazione. A full report appears in this issue of the Journal.

Endowment Fund

The year 1932 has been one of great financial stringency and this has been reflected in the lesser increase in the Endowment Fund as compared with 1931. The Council urge, nevertheless, that all members will keep the Endowment Fund in mind, and seize any opportunity to draw attention to it or to add to it. The future of the Society depends upon a steady and increasing income independent of fluctuation of donations or subscriptions so that the Council can legislate ahead for carrying out schemes which are at present held up.

On the 17th November, 1932, the Endowment Fund reached a total of £2,104 5s. 7d.

The following are additional subscriptions to those which have already been acknowledged in the Journal for December, 1931 :—

	£	s.	d.
Already acknowledged	612	3	0
J. Balfour Murray, Stud.R.Ae.S.I.	0	10	0
Prof. R. Giacomelli, A.F.R.Ae.S.	1	1	0
W. S. Rope, Esq., A.F.C., A.F.R.Ae.S.	2	2	0
E. J. Geoge, Esq., Stud.R.Ae.S.I.	0	10	0
F. W. Sainsbury, Esq., Stud.R.Ae.S.I.	0	10	6
A. J. Henington, Esq., A.M.I.Ae.E.	1	1	0
F. Tymms, Esq., M.C., A.F.R.Ae.S.	1	1	0
F. Harrison, Esq., A.F.R.Ae.S.	1	1	0
H. T. Winter, Esq.	1	1	0
The Oxford Branch of R.Ae.S.I.	20	0	0
	£641	0	6

Awards

The following awards were made for the year 1932 :—

Silver Medal.—To Senor Juan de la Cierva, Fellow, for his work in connection with the development of the Autogiro.

Taylor Gold Medal.—Dr. G. V. Lachmann, Assoc. Fellow, for his paper on " Control Beyond the Stall."

Busk Memorial Prize.—Mr. H. Constant, Assoc. Fellow, for his paper on " Aircraft Vibration."

Bronze Medal.—To Mr. T. W. K. Clarke, Fellow, for his work in furthering the progress of aeronautics.

Simms Gold Medal.—To Mr. P. Salmon for his paper and work on Catapults.

Wakefield Gold Medal.—To Mr. L. G. Frise, Fellow, for his invention of the Frise Aileron.

R.38 Memorial Prize.—To Mr. D. H. Williams and Mr. A. R. Collar for their joint paper on " The Motion of an Airship under Certain Conditions."

Pilcher Memorial Prize.—To Mr. Dowsett, Student, for his paper on " The Design of Aeroplane Controls and Control Systems."

Elliott Memorial Prize.—The winners of the Elliott Memorial Prize for 1932 are Leading Aircraft Apprentice J. M. Bushell and Sergeant Apprentice R. L. Matthews.

Society's Garden Party

The Garden Party held by the President, Mr. C. R. Fairey, and the Council at Hanworth on Sunday, June 19th, proved to be a great success. Over 600 members of the Society and their guests attended the party and of these 440 took advantage of the occasion to have a flight. This is the largest gathering of members and their friends in the history of the Society. The Garden Party was in the nature of an experiment and it was not foreseen how popular it would be. It is hoped to hold a similar function next year, and with the experience which has been gained this year to provide a programme of flying and to arrange the function in other ways which will make it the outstanding and most enjoyable event of the year.

Among those who attended the party were the following :—

Patrick Alexander, Esq., Hon.F.R.Ae.S., C. F. Allen, Esq., Mrs. C. F. Allen, C. V. Allen, Esq., Mrs. C. V. Allen, Miss Allen, Miss D. Allmand, Major

S. Andreas, Czechoslovak Air and Military Attaché, Mrs. Andreas, — Antill, Esq., Mrs. Antill, Miss J. Appleton, B. D. Arnold, Esq., G. N. Ashcroft, Esq., Stud.R.Ae.S.I.

E. C. A. Backhaus, Esq., Stud.R.Ae.S.I., Professor L. Bairstow, C.B.E., F.R.Ae.S., Mrs. Bairstow, Miss E. M. Bairstow, G. H. Bairstow, Esq., H. O. Baker, Esq., Stud.R.Ae.S.I., J. de C. Ballardie, Esq., Mrs. Ballardie, Sir Albion Banerjie, C.S.I., C.I.E., Captain A. J. Barlow, Secretary, Air League of the British Empire, Major T. M. Barlow, M.Sc., M.Inst.C.E., M.I.Mech.E., F.R.Ae.S., Mrs. Barlow, R. B. Barr, Esq., C. W. Barraclough, Esq., Stud.R.Ae.S.I., N. Barraclough, Esq., Miss J. Barraclough, Miss P. Barraclough, Mrs. Barrington-Kennett, F. S. Barton, Esq., M.A., F.Inst.P., B.Sc., Mrs. Barton, Dr. Philippe Bauwens, H. W. Baxter, Esq., Mrs. Baxter, Miss B. Baxter, Miss M. Baxter, Miss E. Beach, H. Beamish, Esq., Comp.R.Ae.S.I., Squadron Leader H. I. T. Beardsworth, R.A.F., Mrs. Beardsworth, A. Beare, Esq., D. Beattie, Esq., S. Beggs, Esq., E. N. B. Bentley, Esq., A.C.G.I., A.F.R.AeS., Mrs. Bentley, J. P. Bertinat, Esq., Stud.R.Ae.S.I., S. Bidmead, Esq., Mrs. Bidmead, Miss D. Binks, G. Binks, Esq., H. E. Biraben, Esq., H. I. Birds, Esq., B.Sc., A.F.R.Ae.S., Mrs. H. I. Birds, R. Blackburn, Esq., O.B.E., F.R.Ae.S., M.I.Ae.E., Capt. A. M. Blake, A.F.C., A. G. Bloxam, Esq., Miss Betty Bloxam, Mrs. Bonham-Carter, W. A. R. Bourne, Esq., Mrs. Bourne, Miss Box, Arthur Boycott, Esq., Mrs. Boycott, Miss M. Boycott, B. Boyles, Esq., F. D. Bradbrooke, Esq., Mrs. Bradbrooke, Miss Bramwell, Miss E. Brandon, Godfrey Brewer, Esq., Mrs. Godfrey Brewer, C. G. Brewer, Esq., A.F.R.Ae.S., Griffith Brewer, Esq., F.R.Ae.S., Mrs. Griffith Brewer, John A. Brewer, Esq., Group Captain E. F. Briggs, D.S.O., O.B.E., A.F.R.Ae.S., Mrs. V. Briggs, Capt. A. L. Bristol, Naval Attaché, American Embassy, Air Marshal Sir H. R. M. Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., Lady Brooke-Popham, D. L. Brown, Esq., Assoc.M.Inst.C.E., A.F.R.Ae.S., Hardman Brown, Esq., Mrs. Hardman Brown, Lawrence Brown, Esq., R. A. Bruce, Esq., M.Sc., M.Inst.C.E., M.I.Mech.E., F.R.Ae.S., Major J. S. Buchanan, O.B.E., F.R.Ae.S., A.M.I.Mech.E., Mrs. Buchanan, J. S. Buchanan, Jun., Esq., Major G. P. Bulman, O.B.E., B.Sc., F.R.Ae.S., Mrs. G. P. Bulman, Mrs. Purvis Bulman, E. Burt, Esq., W. G. Burt, Esq., Mrs. Burt, Lieut.-Col. O. A. Butcher, D.S.O., Miss E. Buttrum, C. Byron, Esq.

F. W. Callow, Esq., D. E. Campbell, Esq., J. D. Campbell, Esq., B.Sc., A.F.R.Ae.S., Mrs. J. D. Campbell, Miss C. C. Campbell, L. S. Campbell, Esq., Stud.R.Ae.S.I., R. S. Capon, Esq., O.B.E., B.A., F.R.Ae.S., Mrs. Capon, — Capper, Esq., Mrs. Capper, Miss R. Casson, Wing Comdr. T. R. Cave-Browne-Cave, C.B.E., M.I.Mech.E., F.R.Ae.S., Mrs. M. Cave-Browne-Cave, Miss Jill Cave-Browne-Cave, Master Jack Cave-Browne-Cave, Mrs. Chappell, Miss O. E. Chilton, Senor J. de la Cierva, F.R.Ae.S., Mrs. de la Cierva, F. G. Clare, Esq., Mrs. Clare, Miss J. M. Clark, Dr. Lyell Clark, F. J. Cleveland, Esq., A.M.I.Ae.E., Mrs. Cleveland, the Misses Cleveland, C. V. Coates, Esq., M.A., A.F.R.Ae.S., Miss Theodora Coates, Miss M. C. Cole, G. A. C. Cole, Esq., Miss Collarbone, — Collarbone, Esq., C. M. Collard, Esq., Stud.R.Ae.S.I., H. W. Collard, Esq., Miss M. E. Collard, H. F. Collender, Esq., Miss E. Collins, Lieut.-Comdr. C. N. Colson, A.R.Ae.S.I., R.N. (Retd.), Flight Lieut. N. Comper, A.F.R.Ae.S., D. W. Cooper, Esq., J. K. Corfield, Esq., A. Cornthwaite, Esq., B. Cornthwaite, Esq., Stud.R.Ae.S.I., Miss G. Cottrell, Comp.R.Ae.S.I., H. Roxbee Cox, Esq., Ph.D., D.I.C., B.Sc., A.F.R.Ae.S., Mrs. Roxbee Cox, F. F. Crocombe, Esq., A.C.G.I., D.I.C., B.Sc., A.F.R.Ae.S., Miss S. Crow, D. Culver, Esq., Mrs. Culver.

Miss Darbyshire, Miss E. Davies, H. Davies, Esq., B.A., A.F.R.Ae.S., Capt. E. Keith Davies, A.M.I.A.E., A.F.R.Ae.S., Mrs. Keith Davies, A. E. Davis, Esq., M. J. B. Davy, Esq., A.F.R.Ae.S., Mrs. Davy, Miss A. Derbyshire,

T. Gronow Devas, Esq., Mrs. Gronow Devas, Miss P. Diffey, R. S. Dolleymore, Esq., Mrs. Dolleymore, — Drew, Esq., Major J. F. Dyer, H. Dyne, Esq., Mrs. Dyne.

R. Easton, Esq., Mrs. Easton, — Edmenson, Esq., Mrs. Edmenson, A. Edwards, Esq., Mrs. Edwards, E. W. Edwards, Esq., A.F.R.Ae.S., Mrs. E. H. Eldridge, Miss Eldridge, W. G. Elliott, Esq., Mrs. Elliott, Miss J. Elliott, Miss U. Elliott, E. C. Gordon England, Esq., F.R.Ae.S., Miss D. Gordon England, R. England, Esq., Miss M. Evans, C. J. C. Ewing, Esq., M.Sc., Stud.R.Ae.S.I.

W. Fairley, Esq., Mrs. Fairley, Miss Joan Fairley, V. M. Falkner, Esq., A.F.R.Ae.S., L. Farey, Esq., Lieut.-Colonel L. F. R. Fell, D.S.O., O.B.E., M.I.Mech.E., F.R.Ae.S., Mrs. Fell, E. Fisher, Esq., Dr. A. H. W. Fleming, T. Y. Fletcher, Esq., Mrs. T. Y. Fletcher, Miss P. de Fontaine, Miss I. Foot, Miss O. Foreman, Capt. A. G. Forsyth, Mrs. Forsyth, Comdr. W. G. Foster, Mrs. Foster, Miss B. Francis, Miss M. Frostick.

Miss E. M. Gale, J. Galler, Esq., H. F. Gammidge, Esq., Flight Lieut. G. L. Gandy, A.R.Ae.S.I., H. H. Gardner, Esq., Miss N. M. George, E. C. Gibbons, Esq., A.F.R.Ae.S., Mrs. Gibbons, S. J. Gilbert, Esq., A.R.Ae.S.I., J. T. Gillie, Esq., H. R. Gillman, Esq., A.F.R.Ae.S., Secretary, the Society of British Aircraft Constructors, Ltd., Mrs. Gillman, J. C. Goldie, Esq., A.R.Ae.S.I., Mrs. Goldie, Miss N. Goode, R. R. Goodbody, Esq., Miss B. Gordon, Miss D. Gordon, D. Goudie, Esq., Miss N. Graham, Miss G. Grason, A. Winter Gray, Esq., Secretary, Institute of Transport, H. W. Gray, Esq., W. E. Gray, Esq., Comp.R.Ae.S.I., H. S. Green, Esq., M.I.A.E., M.I.Ae.E., Miss D. Greenin, — Greenway, Esq., C. G. Grey, Esq., Editor, *The Aeroplane*, P. T. Griffith, Esq., A.F.R.Ae.S., Mrs. Griffith, Capt. the Hon. F. E. Guest, C.B.E., D.S.O., M.P., Chairman, the Air League of the British Empire.

A. H. Hall, Esq., C.B.E., F.R.Ae.S., Mrs. A. H. Hall, A. P. Hall, Esq., Stud.R.Ae.S.I., — Hallam, Esq., Mrs. Hallam, Miss I. Hallén, F. W. Halliwell, Esq., A.M.I.A.E., A.F.R.Ae.S., Mrs. Halliwell, Herr Hansen, E. Hardman, Esq., Mr. I. Harris, A. B. Harrison, Esq., Mrs. A. B. Harrison, B. C. Harrison, Esq., Miss M. C. Harrison, R. St. Clair Harrison, Esq., Mrs. St. Clair Harrison, J. H. Hartley, Esq., B.Sc., A.F.R.Ae.S., Mrs. Hartley, A. Harvey, Esq., Miss D. Harvey, P. Haselock, Esq., Mr. H. S. Haycraft, M. C. C. Haycraft, Esq., Stud.R.Ae.S.I., Mrs. Courtney Haydon, G. Haydon, Esq., B.Sc., F.C.S., A.R.Ae.S.I., — Hayward, Esq., Mrs. Hayward, J. A. Heckman, Esq., A.R.Ae.S.I., J. M. Heesem, Esq., A.F.R.Ae.S., Mrs. Heesem, F. T. Hill, Esq., F.R.Ae.S., M.I.Ae.E., Mrs. Hill, Miss A. M. I. Hill, Miss Hill, R. F. Hill, Esq., Mr. Graham Hitchins, J. W. Hitchins, Esq., Mr. Keith Hitchins, B. Hockmeyer, Esq., J. E. Hodgson, Esq., Comp.R.Ae.S.I., D. L. Hollis-Williams, Esq., B.Sc., A.F.R.Ae.S., Mrs. Hollis-Williams, Flight Lieut. R. H. Horniman, R.A.F., Mrs. Horniman, J. Hudson, Esq., Mrs. Hudson, Miss C. J. Huggins, Miss M. C. Huggins, O. J. Huggins, Esq., D. W. B. Hughes, Esq., A.R.Ae.S.I., Mrs. Hughes, Mrs. Hulme, Miss R. Hulme, Miss L. Humphrey, Miss H. J. Humphries, Mrs. Thomas Hutchinson.

Miss Betty Innes, H. B. Irving, Esq., B.Sc., F.R.Ae.S., Mrs. Irving.

Miss A. Jack, Miss K. Jack, Sir William Jarratt, Lady Jarratt, Miss F. Jarvis, R. H. Jepson, Esq., D. J. Jones, Esq., Miss G. Jones, R. G. Jones, Esq., Stud.R.Ae.S.I., W. H. Jones, Esq.

A. E. Keen, Esq., E. Dixie Keen, Esq., A.R.Ae.S.I., H. Keith-Ross, Esq., Major D. H. Kennedy, O.B.E., F.R.Ae.S., Mrs. Kennedy, Miss Kennedy, E. P. King, Esq., B.Sc., A.F.R.Ae.S., Mrs King, Master King, D. King, Esq.

P. V. Lemarque, Esq., B.Sc.(Eng.), A.F.R.Ae.S., J. E. Lamb, Esq., A.M.I.Ae.E., Mrs. Lamb, Capt. A. G. Lamplugh, F.R.Ae.S., M.I.Ae.E., Mrs.

Lamplugh, M. Langley, Esq., Assoc.M.Inst.N.A., A.M.I.Ae.E., Mrs. M. Langley, W. Lappin, Esq., Comp.R.Ae.S.I., L. Larsen, Esq., C. W. Lawson, Esq., Stud.R.Ae.S.I., Miss Norma Lewis, A. T. Liddell, Esq., Capt. R. N. Liptrot, B.A., A.F.R.Ae.S., M.I.Ae.E., D. Lister, Esq., B.Sc., A.F.R.Ae.S., R. M. Lloyd, Esq., Miss Kathleen Lomax, Squadron Leader H O. Long, D.S.O., R.A.F., Miss Lovegrove, A. C. Lovesey, Esq., B.Sc., A.M.I.A.E., A.F.R.Ae.S., G. Lyon, Esq., M.Sc., A.F.R.Ae.S., J. Lyon, Esq., Mrs. J. Lyon, Colonel Sir Henry G. Lyons, Hon.D.Sc., F.R.S., Director of the Science Museum, Lady Lyons.

Sir F. K. McClean, A.F.C., A.F.R.Ae.S., Lady McClean, Miss F. McClean, Miss I. McClean, J. W. Maccoll, Esq., Ph.D., B.Sc., A.F.R.Ae.S., D. V. Mackay, Esq., H. J. Mackintosh, Esq., A.F.R.Ae.S., W. O. Manning, Esq., F.R.Ae.S., H. D. Mansion, Esq., Monsieur Hans Markus, Counsellor to the Estonian Legation, Madame Markus, V. C. E. Marten-Gwilliam, Esq., A.M.I.Ae.E., Mrs. Marten-Gwilliam, — Maskell, Esq., Mrs. Maskell, Colonel S. Matessi, Greek Air and Naval Attaché, Mrs. Matessi, F. Meadows, Esq., A.F.R.Ae.S., Secretary, Coventry Branch, R.Ae.S.I., Capt. G. F. Meager, A.F.C., Mrs. Meager, F. W. Meredith, Esq., B.A., H. A. Mettam, Esq., M.A., A.F.R.Ae.S., Mrs. Mettam, — Milner, Esq., R. N. Mirza, Esq., Mrs. Mirza, R. Moody, Esq., Mrs. Moody, Miss Moore, Lieut.-Colonel J. T. C. Moore-Brabazon, M.C., M.P., F.R.Ae.S., Mrs. D. Morris, H. H. Morris, Esq., Comp.R.Ae.S.I., Mrs. Morris, Miss Morris, W. Morrison, Esq., Mrs. Morrison, Colonel E. Mossberg, Swedish Air Attaché, James Mould, Esq., Major E. Moyes, Mrs. Moyes, F. J. Murdoch, Esq., Comp.R.Ae.S.I., Commander G. D. Murray, American Naval Attaché, F. W. Musson, Esq., B.A., A.F.C., A.F.R.Ae.S., Mrs. Musson.

Mr. W. Napier, T. F. Nash, Esq., C. H. Latimer Needham, Esq., M.Sc., F.R.Ae.S., Mrs. Latimer Needham, Herr H. W. Neidhardt, Colonel H. Nerinx, Belgian Military Attaché, Mrs. Nerinx, A. H. Nerison, Esq., Mrs. Nerison, L. C. V. New, Esq., N. D. New, Esq., Stud.R.Ae.S.I., H. C. Newton, Esq., A.M.I.Ae.E., Mrs. Newton, Capt. D. Nicolson, M.Inst.N.A., A.F.R.Ae.S., Mrs. Nicolson.

L. O'Connor, Esq., Mrs. O'Connor, Miss O'Connor, Mons V. Ojanson, Secretary of the Estonian Legation, Madame Ojanson, E. O. Orme, Esq., Mrs. Orme, Miss Otterway.

F. Handley Page, Esq., C.B.E., F.R.Ae.S., Mrs. Handley Page, W. H. Paine, Esq., Stud.R.Ae.S.I., D. Parker, Esq., Kenneth Parker, Esq., Miss Parry, Miss H. Parry, Wing Comdr. R. G. Parry, D.S.O., A.F.R.Ae.S., R.A.F., Mrs. Parry, Miss D. Parsons, F. C. Payze, Esq., L. H. B. Pemberton, Esq., A.R.Ae.S.I., H. J. Penrose, Esq., A.F.R.Ae.S., H. E. Perrin, Esq., Secretary, the Royal Aero Club, Mrs. Perrin, Miss V. Perrin, Colonel H. Marrian Perry, Mrs. Marrian Perry, Miss Pert, Sir Joseph E. Petavel, K.B.E., D.Sc., F.R.S., M.I.Mech.E., F.R.Ae.S., Director of the National Physical Laboratory, Miss F. Phillips-Smith, H. Phillips-Smith, Esq., H. T. Philpot, Esq., Mrs. H. T. Philpot, L. M. Pinto, Esq., B.Sc., Stud.R.Ae.S.I., M. A. Pitts, Esq., Stud.R.Ae.S.I., F. B. Poole, Esq., P. R. Poole, Esq., Stud.R.Ae.S.I., Miss Porteous, C. N. Poulsen, Esq., Representative of the Press Association, — Prestcott, Esq., D. Price, Esq., B.A., R.A.F.O., Stud.R.Ae.S.I., C. S. A. Prideaux, Esq., D. L. Prior, Esq., Mrs. D. L. Prior, Capt. J. Laurence Pritchard, Hon.F.R.Ae.S., Secretary of the Royal Aeronautical Society, Mrs. Laurence Pritchard, Master J. D. Pritchard, Miss E. M. Purves.

D. Rainey, Esq., R. C. Rainey, Esq., Capt. H. C. Rawlings, D.S.O., R.N., Air Officer Commanding the Fleet Air Arm, Mrs. Rawlings, Miss S. Rayner, Mrs. R. F. Read, Miss K. Reid, E. F. Relf, Esq., A.R.C.Sc., F.R.Ae.S., Mrs.

Relf, Miss H. G. Richmond, Miss S. Richmond, J. N. Richmond, Esq., Stud.R.Ae.S.I., J. T. Rimbault, Esq., E. C. Roberson, Esq., Mrs. J. H. Rollston-Higham, Miss M. Rosewell, R. Ross, Esq., A.M.I.Ae.E., Mrs. Ross, Master G. R. Ross, H. Russell, Esq., Mrs. Russell.

G. E. Sachs, Esq., Miss C. Saklatvala, Lieut. de Vaisseau A. Sala, French Air Attaché, L. Salisbury, Esq., Miss Sanderson, W. P. Savage, Esq., A.F.R.Ae.S., Major F. M. Scanlon, American Air Attaché, Herr A. H. Van Scherpenberg, Secretary to the German Embassy, Frau Van Scherpenberg, Miss S. Schoubye, Baroness Schrottenberg, Miss W. M. Scott, S. Scott-Hall, Esq., M.Sc., D.I.C., A.F.R.Ae.S., Captain J. Sepp, Estonian Air Force, the Master of Sempill, A.F.C., F.R.Ae.S. (Immediate Past-President, Royal Aeronautical Society), Lieut.-Colonel F. C. Shelmerdine, C.I.E., O.B.E., A.F.R.Ae.S., Director of Civil Aviation, Mrs. Shelmerdine, C. A. Shrubbs, Esq., Sir J. D. Siddeley, K.B., F.R.Ae.S., Lady Siddeley, A. F. Sidgreaves, Esq., O.B.E., Comp.R.Ae.S.I., Mrs. Sidgreaves, Fredk. R. Simms, Esq., M.I.Mech.E., M.I.A.E., M.I.Ae.E., Mrs. Simms, — Simpson, Esq., Mrs. Simpson, Miss J. Simpson, — Sims, Esq., Major E. M. Sinauer, M.C., A.M.I.Ae.E., Mrs. Sinauer, Miss Sinauer, Miss J. Sinauer, Capt. N. Skentelbery, R.A., — Smith, Esq., Mrs. Smith, C. B. Smith, Esq., F. G. W. Smith, Esq., R. S. Smith, Esq., G. J. Smith-Pert, Esq., C. Snow, Esq., Mrs. Snow, Miss Snow, Stanley Spooner, Esq., Editor, *Flight*, T. Stanhope Sprigg, Esq., Editor, *Air and Airways*, Mrs. Stanhope Sprigg, A. Stevens, Esq., G. F. Stevens, Esq., Mrs. Stevens, Major Oliver Stewart, Capt. R. H. Stocken, M.I.Ae.E., Mrs. Stocken, Miss E. Strangways, Miss Stringer, D. H. Surgeoner, Esq., Stud.R.Ae.S.I., Capt. A. Swan, B.Sc., A.M.Inst.C.E., A.F.R.Ae.S., Mrs. Swan.

W. A. Tamblin, Esq., A.M.I.N.A., A.F.R.Ae.S., Major E. Tatsumi, Acting Military Attaché, Japanese Embassy, S. A. Tennant, Esq., A.R.Ae.S.I., Mrs. S. A. Tennant, J. Ternent, Esq., Miss Terry, D. G. Thomas, Esq., Mrs. Thomas, — Thompson, Esq., Miss D. Thompson, Professor G. P. Thomson, F.R.S., Mrs. G. P. Thomson, O. Thornycroft, Esq., O.B.E., A.F.R.Ae.S., Miss K. Thornycroft, A. P. Todd, Esq., Mrs. Todd, Miss M. Todd, H. W. Todd, Esq., J. Todd, Esq., A. Todd, Jun., Esq., Master A. Todd, Master J. Todd, L. Tosen, Esq., Major R. D. G. Townend, M.C., T.D., B. W. Townshend, Esq., A.C.G.I., A.M.I.Mech.E., A.F.R.Ae.S., E. R. Troughton, Esq., S. J. Troughton, Esq., G. C. Trowbridge, Esq., Mrs. Trowbridge, Mrs. F. Tymms, Major C. C. Turner, A.F.R.Ae.S.

Major A. Vernik, Chief of the Estonian Air Defence Staff, S. M. Viale, Esq., M.I.Ae.E., Mrs. Viale, C. Amherst Villiers, Esq., Comp.R.Ae.S.I., C. G. Vokes, Esq., A.M.I.Mech.E., A.M.I.Ae.E., Miss B. Voyce, W. Voyce, Esq., Lady Vyvyan.

E. Walford, Esq., Mrs. E. Walford, C. C. Walker, Esq., F.R.Ae.S., Mrs. Walker, B. N. Wallis, Esq., Mrs. Wallis, J. L. R. Waplington, Esq., Secretary, the British Gliding Association, Mrs. Waplington, H. Ward, Esq., Miss Waters, Miss Watson, the Right Hon. Lord Weir of Eastwood, P.C., F.R.Ae.S., Lady Weir, Air Commodore J. G. Weir, C.M.G., C.B.E., F.R.Ae.S., Mrs. J. G. Weir, Capt. J. Whitney, Mrs. Whitney, E. Wieser, Esq., B.Sc. D.I.C., A.F.R.Ae.S., V. Willems, Esq., C. M. Williamson, Esq., Mrs. Williamson, Miss M. Wilson, W. Wilson, Esq., Stud.R.Ae.S.I., H. E. Wimperis, Esq., C.B.E., M.A., F.R.Ae.S., Vice-President, Director of Scientific Research, Miss V. Wimperis, Miss Winter, H. T. Winter, Esq., Founder Member, R.Ae.S.I., Mrs. Winter, C. J. Wood, Esq., Comp.R.Ae.S.I., R. McKinnon Wood, Esq., O.B.E., M.A., Assoc.M.Inst.C.E., F.R.Ae.S., Mrs. McKinnon Wood, — Woodhouse, Esq., Mrs. Woodhouse, D. Wright, Esq., Stud.R.Ae.S.I., Squadron Leader Maurice Wright, A.F.C., A.F.R.Ae.S., Mrs. Maurice Wright.

R. Zdanowich, Esq., B.A.(Eng.), A.F.R.Ae.S., Mrs. H. Zdanowich.

Presentation to Mr. Harry Guggenheim

The Royal Aeronautical Society is deeply indebted to the generosity of the Trustees of the Daniel Guggenheim Fund for the Promotion of Aeronautics. On the inauguration of the fund the Trustees voted the Society the sum of £1,000, which enabled the Council immediately to take steps to place the Society on a firm basis and to inaugurate schemes which had till then been held in abeyance. The Trustees of the fund followed their generous donation with similar amounts for the following four years, a total of £5,000 before the fund was finally closed.

The help which was thus given cannot be overestimated, for it freed the Society, during years of great difficulty, very largely from financial anxiety, and the expenditure which it was enabled to lay out then is one which will be of lasting benefit. The Council prepared an illuminated address for presentation to Mr. Harry Guggenheim, now the Ambassador of the United States of America to Havana, so that he could have a permanent reminder of the help the fund had given to the oldest aeronautical society in the world. This illuminated address was signed by the Patrons of the Society, H.R.H. the Prince of Wales and H.R.H. the Duke of York, the President (at the time), Colonel the Master of Sempill, the President-elect, Mr. C. R. Fairey, and the Secretary, Captain J. Laurence Pritchard.

Arrangements were made by the Master of Sempill, through the courtesy of the Foreign Office, to present the address through His Majesty's Minister to Cuba, and the following is a copy of a letter received from Sir John Simon, the Foreign Minister:—

Foreign Office, S.W.1,
April 2nd, 1932.

Dear Sempill,

I have now received from His Majesty's Minister at Havana a report on the presentation to the Ambassador of the United States of America of the illuminated memorial forwarded by you on behalf of the Royal Aeronautical Society in your letter of the 16th January last.

Sir J. Broderick reports that on the 27th February last, at 10 a.m., Mr. Guggenheim came to His Majesty's Legation for the purpose of receiving the memorial, accompanied by Lieutenant Elwood Quesada, Air Attaché to the United States Embassy. Sir J. Broderick was accompanied by the members of the staff of His Majesty's Legation. In presenting the memorial His Majesty's Minister referred briefly to the history of the Royal Aeronautical Society and to the work in furthering the science of civil aviation that had been carried out as a result of the munificence of the late Mr. Daniel Guggenheim and the energetic interest of his son. The Ambassador, who was obviously greatly pleased at the compliment paid him by the Royal Aeronautical Society, spoke in graceful terms of the unique position occupied in the aeronautical world by that Society. He stated that each nation had its airmen pioneers who were the "fathers of aviation," but that the "Royal Aeronautical Society" was universally recognised as the mother of the science. When his father had instituted the Guggenheim Fund it had been one of the first thoughts of the Trustees to visit the Society and place in its hands a donation from the fund, which they knew that the mature experience of the Society would apply with especially wise judgment.

Yours very sincerely,
(Signed) JOHN SIMON.

The following letter was received from Mr. Harry F. Guggenheim by the Society, through Major R. H. Mayo, who was the European representative of the Daniel Guggenheim Fund in Europe:—

" I recently had the very great pleasure to receive from the hands of my colleague, the British Minister to Cuba, a memorial from the Royal Aeronautical Society, signed by their Royal Highnesses the Prince of Wales and the Duke of York, the President, the President-Designate and the Secretary of the Society.

I formally accepted the memorial from the British Minister and made my formal acknowledgment to him. However, I am writing to express my deep personal appreciation to you and your associates for the gracious and thoughtful act of the Society. I was deeply touched by the memorial to my father, and I assure you it will be something that my family will always treasure.

Sincerely yours,

HARRY F. GUGGENHEIM."

Acknowledgment of Slides

The Council had printed during the year, in proof form, the index of the Society's slide collection, prepared by the Secretary. This index was sent to aircraft firms inviting them to add to the collection where they thought suitable. The Council's invitation has met with a most generous response, and they wish to acknowledge the following: From Messrs. Rolls-Royce, Ltd., 32 slides of Kestrel engines and their construction; Westland Aircraft Works, two slides of the Pterodactyl Mark IV, in addition to the many Westland slides already acknowledged; the Fairey Aviation Co., Ltd., four slides of the Fairey N.4 Atalanta Flying Boat; Armstrong-Siddeley Motors, Ltd., 11 slides of Armstrong-Siddeley aero engines; Messrs. Napiers, Ltd., 78 slides of Napier engines and their construction; Messrs. Vickers, Ltd., a number of slides of their aircraft in addition to those already acknowledged; Messrs. Short Brothers, 10 slides of Short aircraft, in addition to those already acknowledged; Messrs. Handley Page, Ltd., three slides of the Handley Page slot; the Gloster Aircraft Co., Ltd., five slides of Gloster aircraft, in addition to those already acknowledged; from Mr. W. O. Manning, two slides in addition to those already acknowledged; from Mr. W. Garrow-Fisher, nine slides; and from Mr. J. S. Irving, various engine slides.

Acknowledgments

The Council wish gratefully to acknowledge the following: From the Goodyear Tyre and Rubber Company Inc. (through J. C. Hunsaker, Esq.), photographs of the Akron, Macon and Goodyear non-rigid ships; from Captain F. L. M. Boothby, a photograph of a pre-war Zeppelin signed by Lord Jellicoe; from W. W. Falconer, an autograph letter from Mr. F. Marriott to J. A. Roebuck, M.P., on the Aerial Carriage of Henson; from Messrs. Maggs Bros., photographs of Caproni aircraft; from Wing Commander T. O'B. Hubbard, various historical books and pamphlets; from Captain F. L. M. Boothby, R.N., the gift of a number of photographic postcards of airships; Captain Boothby has generously given a large collection of photographs, papers and pamphlets dealing with airships to the Society and thereby greatly strengthened the historical section on the airship side; the gift of a photograph, full size, of the folding plate in the first edition of a " Treatise on the Art of Flying," by Thomas Walker, from the Director of the Municipal Museums, Hull; from Messrs. Vickers, Ltd., the film of Squadron Leader MacLaren's flight in 1924; the gift of a number of pamphlets and photographs from Mr. W. O. Manning, a bound volume of *La Revue de l'Aviation*, December, 1906—October, 1908, and the Technical Reports of the Inter-Allied Commission on Aeronautical Control in Germany; from Lord Hardwick, a copy of the Atmotic ship, with coloured plates, published in Sydney, 1851; from Lieut.-Comdr. the Hon. J. M. Southwell, two recognition books of wartime aircraft;

from Mr. A. Ogilvie a collection of between 300-400 slides of the early history of aviation. Mr. Ogilvie's collection of aeronautical slides, which he has so generously given to the Society, is undoubtedly one of the finest private collections of slides of the early days of aviation that has been made, and it contains many slides which are unique; from Captain N. MacMillan the gift of programmes of the first Scottish International Aviation Meeting held at Lanark in 1910; from Miss L. M. Cory, a number of aeronautical pamphlets, books and photographs of the period 1909; slides of the Wallace, from the Westland Aircraft Works; slides of engines from the Bristol Aeroplane Company; and photographs of De Havilland aircraft from the De Havilland Aircraft Co., Ltd.; from Mr. M. S. W. Templeman, Associate Fellow, a copy of " Adventures in the Air "—a translation from the French of W. de Fonvielle by J. S. Keltie; from Mr. F. J. Cleveland, Associate Member, leaflets by Mr. G. L. O. Davidson on " The Flying Machine of the Future "; from Mr. W. G. Gould, Associate Fellow, back numbers of the Journal.

Examinations

The interim report of the Education and Examinations Committee was approved by the Council during the year and certain alterations of the Rules were placed before the Annual General Meeting and approved.

In November the Committee submitted the new exemptions from the examinations and the new syllabuses for approval and they were passed by the Council and are now in the Press.

The chief alteration is in Section B of the examination for Associate Member or Associate Fellow, the subjects for which are as follows:—

1. Compulsory Pure or Applied Mathematics.
2. One subject to be taken from the following group:—
   - (*a*) Strength of Aeronautical Materials and Structures.
   - (*b*) Aerodynamics.
   - (*c*) Theory of Internal Combustion Engines.
   - (*d*) Theory of Machines.
3. And one subject to be taken from the following group:—
   - (*a*) Design (Aircraft).
   - (*b*) Design (Aero Engines).
   - (*c*) Air Transport.
   - (*d*) Aircraft Materials.
   - (*e*) Aircraft Instruments (Theory and Design).
   - (*f*) Wireless Telegraphy and Telephony and their application to Aeronautics.
   - (*g*) Meteorology and its application to Aeronautics.
   - (*h*) Navigation and its application to Aeronautics.
   - (*i*) Air Survey and Aerial Photography.

The Committee have paid very careful attention to these syllabuses and it is hoped that with minor alterations they will stand for some time to come. The number of entries for the examinations is showing a steady increase and the Council are of the opinion that the tightening up of the regulations will ultimately be of great benefit to the Society.

Contributions to the Journal

In response to inquiries from a number of members the Council will always be glad to consider contributions on any subject dealing with aeronautics or any of its allied subjects. The Council would like to impress upon all members that

they should look upon the Journal as the proper place of publication of any original work which they may have done. The Journal circulates all over the world and is recognised to be the most authoritative publication of its kind now printed.

By supporting the Journal in this way members will make the Journal still more influential and will enable it to increase its already wide circulation, and in this way directly benefit the Society as a whole.

Corrections

In the review of Testing of High-Speed Internal Combustion Engines by A. W. Judge, the price should be 25/- net, and not 42/- net as stated. $COAO_2$ should read CO and O_2.

In the lecture on Mechanical Tests of Aircraft Structural Components, Fig. 9, on page 683, has been printed upside down.

Mr. L. W. Johnson, who is described as being of Imperial Chemical Industries in the January Journal should have been described as being with the Mond Nickel Company, Ltd.

The paper by Mr. Denne, published in the May Journal was read before the Yeovil Branch, and not the Bristol Branch as stated.

In Lieut.-Comdr. R. R. Graham's paper on "Safety Devices in the Wings of Birds," published in the January *Journal*, the wing tip slot factors, on page 52, for the Willow Grouse should read 1.9 instead of 2.25, and for the Blackcock 2.0 instead of 0.86.

In the article by E. W. Stedman, in the JOURNAL for October, on "An Engineer's Conception of Matter," page 861, line 17 should read,

time, and in some instances with slight heating, it hardens. Why?

Membership Badges

For those members of the Society who wish to have them, a badge has been prepared. The badge shows the symbols of the Society, the peregrine and balloon, in finely chased gilt on a blue enamel background, surrounded by a royal blue border on which appears the lettering "The Royal Aeronautical Society, 1866." The badges are hand made with the greatest care so that they will always retain their original appearance, and it is hoped that members will wear them on all suitable occasions. The price is 5/-, or 5/3 post free.

Obituaries

The Council record with deep regret the deaths of many of its members during the year, and express their deep sympathy with their relatives.

CAV. E. LANZEROTTI-SPINA, 1876-1932, *Associate Fellow.*

Cavalier Ettore Lanzerotti-Spina, R.I.N.C., Associate Fellow of the Society, who died after a short illness on February 14th, 1932, was born in Sicily in 1876.

Endowed with remarkable physical strength he was, in his youth, a noted athlete, and excelled at wrestling, swimming, fencing and cycling. After graduating at the Nautical University he reached the rank of Naval Captain and Engineer. Attracted towards civil engineering he moved to Paris and became the chief engineer to an automobile firm. Realising that he could not carry out his ideas without a thorough and first hand knowledge of all the tools, machines and processes needed, he took the unusual step of resigning his post and entered the firm of Panhard and Levasseur as a workman, starting from the very bottom.

In 1914 he met Mr. Parry Thomas in Paris and agreed to come to England with him to assist in the development of the Thomas transmission system. With the outbreak of war the E.L.S. Engines, Ltd., was formed to exploit Cavalier Lanzerotti-Spina's remarkable designing abilities. A contract was obtained from the Air Ministry for the construction of two engines of a new type and larger than any in service or construction, known as the Stromboli, a compliment to his native country; these engines were water-cooled, six-cylinder in line, and gave 1,500 h.p. at the very low speed of 900 r.p.m. The cylinders of 12in. bore and pistons with 16in. stroke were a revolutionary advance on anything then existing. The h.p. was 250 per cylinder at a time when no other engineer had attempted more than 60. The pistons were of forged aluminium alloy and the Stromboli was thus directly responsible for the introduction of such pistons for aeroplane engines.

The end of the war put an abrupt end to what appeared to be a promising line of development and Cavalier Lanzerotti-Spina set up as a consulting engineer, continuing his work for the Air Ministry and developing ideas, ahead of his time, which will live and form his true monument. A man of great gifts and one who had real genius for the solution of mechanical problems, his death will leave a gap difficult to fill.

He married in 1916 an English lady who survives him, but he retained his Italian citizenship, and it was on the nomination of the Italian Ambassador in London that he was elevated to the rank of Cavalier. In 1927 he was elected an Associate Fellow of the Society and showed the keenest interest in its work, and was always to be seen at all its functions.

Herbert Lloyd, 1879-1931, *Associate Fellow.*

Mr. Herbert Lloyd, an Associate Fellow of the Society, was one of the early pioneers of aviation. He was the elder son of the late Mr. G. H. Lloyd and grandson of the first chairman of Lloyds Bank, Ltd. Educated at Rugby School he served three years in the shops and drawing office of Thomas Piggott and Co., of Birmingham, of which firm he eventually became a director. He was on the Continent learning German and French when he had the good fortune to be present at Wilbur Wright's first aeroplane flight at le Mans in 1908. In 1909 he assisted A. V. Roe to build the first successful British aeroplane, and after being associated with Messrs. T. W. K. Clarke and Co., at Kingston-on-Thames, the first aviation firm in this country, he became assistant works manager to the Sopwith Aviation Company, Ltd., until 1916, when he joined the Royal Flying Corps. Later he was specially attached to the Southern Aircraft Repair Depot at South Farnborough, where he remained until 1919. He was elected an Associate Fellow of the Society in 1912 and was a founder member of the Institution of Aeronautical Engineers.

Mr. Lloyd always took the deepest interest in aviation and his loss was a severe blow to his many friends in the industry.

Robert Alexander Seaton, 1899-1932, *Associate Fellow.*

Robert Alexander Seaton died in September, 1932, after a long illness, at the early age of 33. He joined the Royal Flying Corps in 1917 and after serving until 1919 as pilot, he entered the workshops and design office of Messrs. A. V. Roe, at Hamble, where he remained until 1923. In that year he joined the Bristol Aeroplane Company and the following year the design office of Messrs. S. E. Saunders, at Cowes, to gain as wide an experience as possible. In 1923

he was commissioned in the R.A.F. Reserve and in 1925 he was given a commission in the Royal Air Force. From 1926-28 he was employed as flying instructor and lecturer on technical subjects at No. 4 Flying Training School and from 1929-1930 on the engineer staff at headquarters of the R.A.F., Middle East, at Cairo. He was an E specialist officer and was one who would have gone far in the service had he lived.

NOEL WILLIAM NICHOLLS, 1903-1932, *Associate*.

Pilot-Sergeant N. W. Nicholls was killed when the machine in which he was flying near Wittering crashed in March, 1932. He was a holder of a pilot's " B " licence and a 2nd class navigator's licence with 1,300 hours' twin-engined aircraft experience and also qualified as carpenter-rigger. An all-round man, and an exceptionally good pilot, Sergeant Nicholls became an Associate of the Society only a few months before his death.

JOHN MYLES, 1898-1932, *Associate Fellow*.

John Myles died in July as a result of a motor cycle accident. Born in March, 1898, he took a diploma at the Heriot-Watt College in 1920 and a B.Sc. at Edinburgh University in 1923. From 1913-1917 he served his apprenticeship in engineering shops and in 1925 he was appointed a junior scientific officer at the Royal Aircraft Establishment. In 1926 he was promoted technical officer, a post he held until his death. His work at the Royal Aircraft Establishment was connected with special aircraft instruments and controls. Mr. Myles became an Associate Fellow of the Society in 1929.

SIR DUGALD CLERK, K.B.E., F.R.S., *Fellow*.
1854-1932.

Sir Dugald Clerk was elected a Fellow of the Society in 1917. The son of Mr. Donald Clerk, of Glasgow, he was born in 1854 and trained in his father's works. In 1877 he joined the Crown Ironworks, where he began his experiments on the gas engine. In 1881 he made his discovery of an alternative to the Otto cycle. For his researches on the specific heat of gases and on explosive pressure he was elected in 1908 a Fellow of the Royal Society. In 1906 he was awarded the Albert Medal of the Royal Society of Arts for his work on the development of the internal combustion engine, and in 1924 a Royal Medal from the Royal Society. During the war Sir Dugald Clerk was Director of Engineering Research at the Admiralty and was a member of the Advisory Committee for Aeronautics, chairman of the Internal Combustion Engine Committee of that body and member of the Air Inventions Committee and of the Panel Board of Inventions and Research. He was the author of many papers and lectures and books on gas and petrol engines. He was created a K.B.E. in 1917 and died on November 12th, 1932.

GEORGE HAM, 1888-1932, *Associate Fellow*.

George Ham, who was elected an Associate Fellow in 1920, was educated at Owen School, where he obtained a scholarship to the University of London and obtained his B.Sc. degree in engineering in 1908. From 1908-1913 he was pupil and subsequently engineering assistant to Edward Evans. During the war he was an engineering assistant in the experimental department of the Aircraft Manufacturing Co., Ltd., and helped in the design of many of the De Havilland aircraft. In 1920 he became a Fellow of the Chartered Institute of Patent Agents. He began his own practice as a patent agent in 1925 and in a short time had built up a large practice. His death is a great loss to aviation.

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REVIEWS

Laws of Turbulent Flow in Smooth Pipes

By G. Nikuradse. (Forschungsheft, No. 356.) V.D.I Verlag, Berlin. R.M. 5 (in German).

This is an authoritative account of the work which has been done at the Aerodynamic Institute of the University of Göttingen on turbulence in pipes. Most of the practical work involved, consisting of measurements with pitot tubes across the open end of pipes of various lengths, was done by Dr. Nikuradse himself. It is perhaps unfortunate that readings were not attempted in the body of the pipe, *i.e.*, with a hot wire anemometer or " disappearing " pitot orifice, in order that the effect of the flow beyond the experimented region could have been examined; but in so far as these measurements show the effect of integrated flow up to any given length from the entrance, they form valuable data on which the author is able to test a number of theoretical hypotheses; the seventh power law of transverse velocity distribution, the Prandtl " mixing length," etc. The results obtained for the resistance coefficient of the tube are compared with those of previous workers, particularly with those of Stanton and Pannell for a range of values and Reynolds numbers.

Besides the description of the work at Göttingen, the author incorporates a valuable critique of the present position of the turbulence problem as far as it affects flow in pipes.

Yearbook 1932 of the Deutsche Versuchsanstalt für Luftfahrt

Edited by Dr.-Ing. Wilh. Hoff. Berlin and Munich, 1932. (R. Oldenburg, publisher.) Price R.M. 35.

The 1932 Yearbook of the D.V.L. (German Experimental Institute for Aviation) is now to hand. In the report for the year ended March 31st, 1932, the fact the most remarkable for the history of the Institute appears to be the decision that the D.V.L. will remain at the Adlershof Aerodrome and that, during the next few years, its installations and laboratories will be gradually enlarged and improved. The first additions, already well under construction in the meantime, will be a small wind tunnel, a propeller testing house containing both a test stand for measuring propeller performances and a stand for tests to destruction, and another wind tunnel with oval cross-section of 23 by 16 feet.

In the first part, the various departments give accounts of their activities in the form of abstracts of the special tests undertaken, together with a list of lectures and papers read by members of the department. The second part of the Yearbook contains 53 papers of the various departments. For the sake of economy, several of those papers already available in other forms, could only be reprinted in abstract, while for those already published in periodicals of suitable size, reprints were collected and bound together to form part of the book.

The following are cited as a few examples of the manifold activities of the staff: A research in which the polar curve of an aeroplane was obtained in actual flight, with special reference to the effect of the slipstream; vibrations of airscrew blades, studied by means of cinematograph films; an independent investigation of the Meopham disaster by test of a similar Junkers plane, but suggesting no certain cause for the failure; new instruments such as a tachometer, compression meter; tests of safety glass; X-ray analysis of fabrics; new cameras

for aerial photography and the use of infra-red rays; applications of electric technology in air travel; apparatus for directing blind landing; tests of the automatic Handley Page slot; analysis of noise in aircraft; and finally important statistics of failures and their causes during 1932.

These titles should suffice to indicate the interest and importance of the work being done at the German equivalent of the R.A.E.

The Heat Treatment and Annealing of Aluminium and its Alloys

By N. F. Budgen, Ph.D., M.Sc. (Chapman and Hall.) 25/-.

This is a comprehensive treatise on the subject described by its title and those interested in this subject will find practically all the information they may require within the covers of this volume. Mr. Budgen has collected his matter from a very large number of scattered sources and arranged and tabulated it so that it is available for quick reference. There are about 300 references in the bibliography dealing with aluminium and its alloys alone.

The author discusses the various theories which have been proposed to account for the increase of strength of many aluminium alloys after ageing, but it is clear that precise knowledge on this matter must wait until much more information has been collected on the molecular arrangement of the ingredients. The almost complete absence of knowledge, as apart from theories, on such matters is common in most metallurgical matters. The collection of theories given, ending on page 53, with " hardening by bending of electrons at lattice discontinuities " is not illuminating.

It is interesting to note the stress laid on the importance of heat treating castings. There is no doubt that in many cases a simple heat treatment of such parts would improve materially the mechanical properties, and one agrees with the author in noting that while heat treatment of iron alloy castings is taken as a matter of course, similar treatment of aluminium is objected to by manufacturers on the ground of expense. Such an attitude can only be due to ignorance of what is involved in such treatment and the advantages of it, and it is this ignorance which this book may do much to dissipate.

It is to be hoped that in future editions the author will add a table giving figures for the heat conductivity of the various aluminium alloys. It not infrequently happens in connection with the design of internal combustion engines that the dimensions of a part may be more dependent on the heat flow through it than on strength considerations.

There is an error on page 89, silmalec being referred to in the letterpress and aludur on the diagrams. One would also doubt that the cost of chromium would rule this metal out as a possible alloying element for aluminium, as stated on page 99.

This book can be thoroughly recommended as an excellent treatise on the subject with which it deals.

International Air Guide

Two vols. (Sampson Low.) £2 5s. od. net.

This book is produced for the assistance of the air tourist and contains an immense amount of information on all sorts of matters which directly concern the traveller by air.

It contains a useful selection of tables which are so arranged as to be convertible into foreign weights and measures and the laws and regulations of ground organisation, including the special regulations which are peculiar to all the various countries which a European tourist is likely to visit. There is also information on the official clubs and other bodies of the different nations. Particulars of private aviation, details of air postal services, commercial aviation, etc., are given, and there is also a useful collection of air maps giving routes

between the larger towns and a list of all aerodromes, the more important of which are illustrated with maps, not only of the aerodrome, but of its position relative to the town. This information is given in three languages—English, French and German.

The whole publication is well got up and arranged so as to be convenient for reference, though it is unfortunate that the route maps are so bound as to make it difficult to refer to the part in the centre of the double page.

It is a tribute to the importance of our tourism that it has been found possible to produce commercially a work such as this, which, it should be noted, is the second edition, and it can now be said that the wants of our travellers are more thoroughly provided for than are those of travellers using other methods of transport. One of the difficulties has always been the position and extent of prohibited areas. These are very clearly marked on the maps given here. Such countries as Jugo Slavia have the entire frontier surrounded by a broad band of prohibited area and at first sight it would appear impossible for the traveller by air to enter the country. But on referring to the letterpress it is found that international aviation is permitted on certain routes which are laid down in detail. It appears also that the whole of the northern frontier of Italy is prohibited. In this latter case the Ministerial Decree bearing on the subject is published so that anyone interested has all the information at his disposal.

Such a book should be invaluable to those contemplating a foreign tour by air and the information given is also of interest to others. In fact the book is a most important work of reference. The value of it is increased by an ingenious index which facilitates reference to the various sections.

THE
ROYAL AERONAUTICAL SOCIETY
With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

JANUARY 1932

1932

The President and Council wish all members a prosperous New Year.

The year 1931 has been one of great difficulty in many ways and the President and Council have continually had before them, through the reports of their Finance Committee, the accounts of the Society. Under the able and energetic chairmanship of Major D. H. Kennedy careful consideration has been given every month to expenditure and much of the work which the Council would have liked to have carried out has been postponed under the advice of the Finance Committee. At the beginning of the year an appeal was launched for the Endowment Fund, the whole of the heavy expenses of which were borne by the President, Mr. C. R. Fairey, who has, during the year, helped the Society financially in many ways. No one foresaw the severe financial depression which characterised 1931 and the appeal did not reach the high expectations hoped for.

The President and Council wish to thank all members for their help during 1931. They fully realise that at the present time subscriptions to scientific societies have to be scrutinised very carefully by members. Those to the Royal Aeronautical Society are among the lowest of any and the policy of the Council is to keep them as low as possible. The greater the membership the less each individual fee, and the Council urge upon every member to bear this point of view in mind, and encourage all those to join who are qualified to do so.

To quote from the Endowment Fund appeal, " The real value of the Society's work must always depend on the energy, the loyalty and the mutual co-operation of its officers and members."

Lecture Programme for Second Half of Session 1931-32

January 14th.—" Interference." Mr. E. Ower, F.R.Ae.S.

January 28th.—" Some Factors Affecting Range, with Special Reference to Height." Mr. A. E. Woodward-Nutt, B.A., A.F.R.Ae.S., and Flight Lieut. A. F. Scroggs.

February 4th.—" The Organisation of Air Routes and Aerodromes for Night Flying." Dr. R. Benkendorff.

February 11th.—" Tests of Aircraft Components." Mr. I. J. Gerard, M.Sc., A.F.R.Ae.S.

February 25th.—" Catapults." Mr. P. Salmon.

March 1st.—" Diesel Engines for Road Transport." Mr. C. B. Dicksee. (Joint Meeting with the Institution of Automobile Engineers.)

March 10th.—" Results with the New Wind Tunnel at the National Physical Laboratory." Mr. E. F. Relf, F.R.Ae.S.

April 7th.—" Wing Construction." Mr. H. J. Stieger, D.I.C., A.F.R.Ae.S.

April 14th.—" Aero Engine Accessories." Mr. W. L. Taylor.

April 21st.—" Air Port Development." Mr. Nigel Norman, B.A., A.F.R.Ae.S. (Joint Meeting with the Institute of Transport.)

Council Meeting

A Meeting of Council was held on Tuesday, December 15th, 1931. Present: In the chair, Colonel the Master of Sempill, Immediate Past-President; Captain P. D. Acland, Major T. M. Barlow, Mr. Griffith Brewer (Vice-President), Major G. P. Bulman, Captain F. T. Hill, Mr. J. E. Hodgson (Hon. Librarian), Major D. H. Kennedy (Hon. Treasurer), Captain A. G. Lamplugh, Mr. M. Langley, Mr. W. O. Manning, and Mr. A. F. Sidgreaves.

Among the business transacted was the following:—The interim report of the Education Committee on the Examination for Associate Fellowship; the report of the Finance Committee; the report of the Grading Committee; additional lectures to the Lecture Programme.

Elections

The following recommendations of the Grading Committee were approved by the Council at their meeting on 15th December, 1931:—

Associate Fellows.—Anath Bandhu Ray, John Hugh Coulson Wake (from Associate), Eugene Wieser (from Student).

Associate Member.—George Thomas Harvey Pack.

Associates.—Hugh Thornley Andrews, Noel William Nicholls, Christopher Stainbank Staniland, John Gordon Frederick Ward.

Students.—Charles Martyn Collard, Ronald W. F. Farthing, Francis Patrick Moran, R. J. Schmidt, John Leslie Watkins.

Companions.—William Malcolm Neville (re-elected), Alfred Horace Elkington (from Student), Frank John Murdoch, Howard Arthur Wills, Miss Delphine Reynolds.

Election of Council

Attention is drawn to Rules 75-92 regulating the constitution of the Council and in particular to Rules 86 and 88:—

RULE 86.—One half of the Council (excluding the President and the Immediate Past-President, if a member of Council) shall retire annually. The members who shall retire shall be those longest in office, except as provided in Rule 92. Retiring members of Council who have served two terms in succession (four years) shall not be eligible for re-election until the next annual election, when they will be eligible.

RULE 88.—Nominations of candidates for election to the Council must be received by the Secretary not less than twenty-one days before the Annual General Meeting, with an intimation in writing by the candidates that they are willing to serve. Nominations must be signed by one supporter and two seconders, who must be each entitled to vote in the R.Ae.S.I.

Under Rule 112 the Annual General Meeting is held at some convenient date before the end of March of each year.

Acknowledgments

The Council gratefully acknowledge from Captain N. MacMillan the gift of programmes of the first Scottish International Aviation Meeting held at Lanark in 1910; and from Captain Boothby a large framed signed caricature of a war-time dirigible.

Subscriptions

Members are reminded that their subscriptions are due on January 1st, 1932. The Society, like all other institutions, is passing through a difficult time, and the Council hope that every member will make every effort to pay his subscription as early as possible in the new year. The rates are:—

	Home.			Abroad.		
	£	s.	d.	£	s.	d.
Fellow	4	4	0	3	3	0
Member	4	4	0	3	3	0
Associate Fellow	3	3	0	2	2	0
Associate Member	3	3	0	2	2	0
Associate	*2	2	0	*2	2	0
Student	1	1	0	1	1	0
Companion	2	2	0	2	2	0
Founder Member	2	2	0	2	2	0

* £1 1s. 0d. without Journal.

The Aeronautical Diary, 1932

The Aeronautical Diary for 1932 has just been published by Messrs. Gale and Polden. For those who are members of the Society, the diary is obtainable with the Society's crest on it in gold. The diary contains very full information of aeronautical bodies, flying clubs, civil flying schools, aircraft and aero engine manufacturers, commercial and light aircraft, aero engines, notes on licensing private pilots, air touring facilities, air stations, air records and aircraft making, as well as tables and other information of interest to airmen, forthcoming lectures, etc. It is hoped that every member of the Society will buy a copy of the diary, for by buying it every member is directly helping the Society, as a percentage of the profits from all copies sold is being given by the publishers to the Endowment Fund. The prices of the diary are as follows:—Bound in blue cloth, without loop and pencil, 1s. 6d. net; in blue cloth, with loop and pencil, 2s. net; in royal blue leather, with loop and pencil, 3s. net; in refill form in solid blue morocco leather wallets, 7s. 6d.

Applications for the Aeronautical Diary should be made direct to Messrs. Gale and Polden, Aldershot, and not to the offices of the Society.

Forthcoming Events

Thursday, January 7th.—Lecture before the Yeovil Branch by Captain J. L. Pritchard, Hon.F.R.Ae.S., on "Ten Years' Progress(?) in Aeronautics."

Friday, January 8th.—Lecture before the Hull and Leeds Branch by Major R. H. S. Mealing, A.R.Ae.S.I., on "The Progress and Prospects of Civil Aviation."

Wednesday, January 13th.—Lecture before the Watling Association at Barnfield School, Edgware, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Thursday, January 14th.—Lecture, "Interference," by Mr. E. Ower, F.R.Ae.S., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Thursday, January 14th.—Lecture before the Gloucester and Cheltenham Branch by Mr. I. J. Gerard, M.Sc., A.F.R.Ae.S., on "Mechanical Testing."

Thursday, January 14th.—Lecture before the Yeovil Branch by Mr. Tresilian, of Rolls-Royce, Ltd., on "Rolls-Royce Schneider Engines."

Monday, January 18th.—Lecture before St. Olave's School by Mr. W. O. Manning, F.R.Ae.S.

Tuesday, January 19th.—Lecture before the Bristol Branch by Mr. F. Handley Page, C.B.E., F.R.Ae.S., on "Some View Points in the Design of Modern Commercial Aircraft."

Thursday, January 21st.—Lecture before the Gloucester and Cheltenham Branch by Captain C. D. Barnard on "Civil Aviation."

Thursday, January 21st.—Lecture before the Yeovil Branch by Mr. H. J. Penrose, A.F.R.Ae.S., on "A Visit to South America."

Friday, January 22nd.—Lecture before King's College School, Wimbledon, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Saturday, January 23rd.—Lecture before Elstree School by Comdr. L. D. Mackintosh, D.S.C., A.F.R.Ae.S, R.N.

Monday, January 25th.—Lecture before Nottingham High School by Mr. W. P. Savage, A.F.R.Ae.S.

Thursday, January 28th.—Lecture, "Some Factors Affecting Range, with Special Reference to Height," by Mr. A. E. Woodward-Nutt, B.A., A.F.R.Ae.S., and Flight Lieut. A. F. Scroggs, in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Thursday, January 28th.—Lecture before the Yeovil Branch by Senor J. de la Cierva on "The Autogiro."

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

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MONTHLY NOTICES

FEBRUARY, 1932

Technical Grades of the Society

At regular intervals the Council review the rules and regulations for technical membership of the Society. The Society exists, *inter alia,* "for the general advancement of aeronautical science and engineering," and those objects, as laid down in the first rule of the Society, are constantly borne in mind.

The science and engineering of aeronautics are now approaching that stage —in the opinion of many they have already reached it—at which they have become distinct professions of their own, requiring similar rules and regulations as are applied to older branches of science and engineering.

In 1927 the Council entirely redrafted the Rules of the Society, on the occasion of the incorporation of the Institution of Aeronautical Engineers, with the object of giving a definite value to technical membership of the combined body. The status of all technical grades was very considerably raised by this step, and the appointment of a Grading Committee ensured that all applicants for admission from that date would have such knowledge and experience as would enable them, if elected to a technical grade, to make use of their membership when applying for a post.

Four years' experience of the working of the new rules enabled the Council to consider in what way they may be altered to raise the standard still more, and to place technical membership of the Society on an equal standing in aeronautics with that of, say, the Institution of Civil Engineers.

An Education and Examinations Committee was appointed two years ago, and after close discussion and very considerable work, has presented a written report which the Council have accepted. A summary of the report is published in these notes and new rules will be put forward for consideration and approval by the members. These new rules for Associate Fellowship, Associate Membership and Associateship, together with a new examination syllabus and a new list of questions for the Society's examinations, will, it is hoped, prove of such a high standard that there will be no occasion to revise them for many years.

The Council hope that all members of the Society will carefully consider the grade in which they are in the light of their present qualifications and the experience they have obtained since they were elected. The Council feel that it should be the object of every member to apply for as high a grade in the Society as possible consistent with its qualifications.

Society's Telephone Number

Will all members please note that the telephone number of the Society has been changed from Gerrard 7373 to **Regent 6800**?

Education Committee

The interim report of the Education and Examinations Committee, which has been considering the rules and regulations for admission to the Society of Associate Fellows, Associate Members and Associates, has been approved by the Council. This interim report deals only with certain regulations for Associate Fellowship, as these suggested alterations raised important points upon which the agreement with and approval of the Council were desired before further suggestions were made. It is hoped that the report for Associate Membership and Associateship will be issued in the March Journal.

The Education Committee is comprised of the following members:—

Major T. M. Barlow, M.Sc., F.R.Ae.S.
Professor L. Bairstow, C.B.E., F.R.S., F.R.Ae.S.
R. S. Capon, Esq., O.B.E., B.A., F.R.Ae.S.
W. E. Dumbrill, Esq., B.Sc., A.R.C.Sc., F.R.Ae.S.
A. T. E. Eadon, Esq., M.I.Ae.E.
C. R. Fairey, Esq., M.B.E., F.R.Ae.S.
Captain F. T. Hill, F.R.Ae.S., M.I.Ae.E.
Professor B. Melvill Jones, A.F.C., F.R.Ae.S.
W. M. Page, Esq., C.B.E., M.A.
N. A. V. Piercy, Esq., D.Sc., F.R.Ae.S.
R. K. Pierson, Esq., M.B.E., B.Sc., Assoc.M.Inst.C.E., F.R.Ae.S.
D. R. Pye, Esq., M.A., F.R.Ae.S.
W. P. Savage, Esq., A.F.R.Ae.S.
H. T. Tizard, Esq., C.B., A.F.C., F.R.S., F.R.Ae.S.
Captain G. S. Wilkinson, F.R.Ae.S.
Lawrence A. Wingfield, Esq., M.C., D.F.C., A.R.Ae.S.I.

The following are the essential points from the Committee's report:—

Rules 16, 17, 18 and 19 to stand.

Rules 20, 21, 22, 23, 24 and 25 to be replaced by the following rules numbered 20, 21, 22 and 23.

20. *Training.*—Every candidate shall moreover possess one, at least, of the following groups of qualifications numbered respectively (21) and (22) and (23).

21. (*a*) He shall have been regularly trained as a pupil or an apprentice under the direction of a Fellow or a Member for at least three years.

(*b*) He shall have had in addition three years' experience in the design or in the construction of such works as are comprised within the profession of aeronautics; or three years' experience in the development of the science of aeronautics; or three years' experience in the application to aeronautics of special branches of science, mathematics, or engineering; or three years' practical flying, as experimental pilot, or he shall have had a total of three years' experience in the foregoing.

22. (*a*) He shall have followed a regular course recognised by the Council as leading to a degree or diploma exempting from Sections A and B of the Associate Fellowship Examination, and shall have obtained that degree or diploma.

(*b*) He shall have had in addition three years' experience in the design or in the construction of such works as are comprised within the profession of aeronautics; or three years' experience in the development of the science of aeronautics; or three years' experience in the application to aeronautics of special branches of science, mathematics, or engineering; or three years' practical flying as experimental pilot, or he shall have had a total of three years' experience in the foregoing.

23. He shall have had at least eight years' experience of a character satisfactory to the Council as an assistant to a Fellow, Member, Associate Fellow, or Associate Member.

The above alterations to the rules will come before the Annual General Meeting in March, 1932.

EXEMPTIONS AND EXAMINATIONS.

Section A of the examination in general to stand subject to minor amendments.

Section B of the examination to be altered as follows:—

1. *Compulsory.*—Pure or applied mathematics.
2. One subject from the following group:—
   - (*a*) Strength of Aeronautical Materials and Structures.
   - (*b*) Aerodynamics.
   - (*c*) Thermo-dynamics, Aero Engine.
   - (*d*) Theory of Machines.
3. One subject from the following group:—
   - (*a*) Design (Aircraft).
   - (*b*) Design (Aero Engines).
   - (*c*) Air Transport.
   - (*d*) Chemistry and its application to Aeronautics.
   - (*e*) Metallurgy and its application to Aeronautics.
   - (*f*) Design and Theory—Aircraft Instruments.
   - (*g*) Wireless Telegraphy and its application to Aeronautics.
   - (*h*) Meteorology and its application to Aeronautics.
   - (*i*) Navigation and its application to Aeronautics.
   - (*j*) Physics and its application to Aeronautics.
   - (*k*) Mathematics and its application to Aeronautics.

EXEMPTIONS.

Any degree in Engineering, Mathematics, Physics, Chemistry or Metallurgy of any University of the United Kingdom will be accepted to exempt from the whole examination provided the candidate can show he has applied his knowledge to aeronautics. Any other degree or diploma of any other University or educational establishment may exempt at the discretion of the Council.

A candidate over 33 years of age and who has been in the design and construction of such works as comprise the profession of Aeronautics, or development or application to Aeronautics of special branches of science or engineering for at least ten years may submit a thesis as an exempting qualification.

The Committee recommend that the above regulations come into force on January 1st, 1933.

Council Meeting

A meeting of Council was held on Tuesday, January 12th, 1932, in the offices of the Society.

Present: Mr. C. R. Fairey, M.B.E., F.R.Ae.S., President, in the chair. Colonel the Master of Sempill (Past-President), Mr. Griffith Brewer (Vice-President), Mr. A. H. Hall, Major D. H. Kennedy (Hon. Treasurer), Mr. M. Langley, Mr. W. O. Manning, Lieut.-Colonel J. T. C. Moore-Brabazon (Vice-President), Lieut.-Colonel F. C. Shelmerdine, Mr. A. F. Sidgreaves, Mr. H. E. Wimperis (Vice-President).

Among the business transacted was the following: The interim report of the Education Committee; the report of the Finance Committee; the report of the Grading Committee; and the grading of members of the Society.

Elections

The following recommendations of the Grading Committee were approved by the Council at their meeting on Tuesday, January 12th, 1932:—

Associate Fellows.—William Henry Hambrook, Colin Campbell Mitchell, William Grenville Parsonson, Percy Brooksbank Walker.

Associate Member.—Augustus Alfred Ward Barron (re-elected).

Students.—William Read Bendall, Charles Gordon Knight Browne, James William Diaper, Michael Chitty Clendon Hayeraft.

Companion.—Athol Rudolph Mayhill.

Lecture Programme

The results with the new wind tunnel at the National Physical Laboratory not being sufficiently far advanced to justify a lecture in March, the lecture by Mr. E. F. Relf, F.R.Ae.S., has been postponed until the next Session.

Engineering Journal

With this issue of the JOURNAL each member should receive No. 2 of *The Engineering Journal* (Aeronautical Section Reprint), issued under agreement with the Engineering Institute of Canada.

Subscriptions

Members are reminded that their subscriptions are due on January 1st, 1932. The Society, like all other institutions, is passing through a difficult time, and the Council hope that every member will make every effort to pay his subscription as early as possible in the new year. The rates are:—

	Home.			Abroad.		
	£	s.	d.	£	s.	d.
Fellow	4	4	0	3	3	0
Member	4	4	0	3	3	0
Associate Fellow	3	3	0	2	2	0
Associate Member	3	3	0	2	2	0
Associate	*2	2	0	*2	2	0
Student	1	1	0	1	1	0
Companion	2	2	0	2	2	0
Founder Member	2	2	0	2	2	0

* £1 1s. 0d. without Journal.

Election of Council

Attention is drawn to Rules 75-92 regulating the constitution of the Council and in particular to Rules 86 and 88:—

RULE 86.—One half of the Council (excluding the President and the Immediate Past-President, if a member of Council) shall retire annually. The members who shall retire shall be those longest in office, except as provided in Rule 92. Retiring members of Council who have served two terms in succession (four years) shall not be eligible for re-election until the next annual election, when they will be eligible.

RULE 88.—Nominations of candidates for election to the Council must be received by the Secretary not less than twenty-one days before the Annual General Meeting, with an intimation in writing by the candidates that they are willing to serve. Nominations must be

signed by one supporter and two seconders, who must be each entitled to vote in the R.Ae.S.I.

Under Rule 112 the Annual General Meeting is held at some convenient date before the end of March of each year.

Correction

Mr. L. W. Johnson, who is described as being of Imperial Chemical Industries in the January Journal should have been described as being with the Mond Nickel Company, Ltd.

Forthcoming Events

Tuesday, February 2nd.—Lecture before the Students' Section by Mr. S. G. Hooker, "Aerodynamics of Streamlining," in the Library of the Society, at 6.30 p.m.

Thursday, February 4th.—Lecture, "Night Flying," by Dr. R. Benkendorff, in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Thursday, February 4th.—Lecture before the Gloucester and Cheltenham Branch by Squadron Leader W. R. D. Acland, D.F.C., A.F.C., on "Deck Landing."

Thursday, February 4th.—Lecture before the Yeovil Branch by Mr. Hodgson, A.I.D., on "Engine Maintenance."

Thursday, February 4th.—Lecture before Ryde Grammar School by Mr. T. A. S. Lloyd, A.R.Ae.S.I.

Friday, February 5th.—Lecture before King's School, Ely, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Monday, February 8th.—Lecture before King Edward's School, Southampton, by Wing Comdr. T. R. Cave-Browne-Cave, C.B.E., F.R.Ae.S.

Monday, February 8th.—Lecture before Framlingham College by Mr. S. Scott-Hall, M.Sc., D.I.C., A.F.R.Ae.S.

Monday, February 8th.—Lecture before Boys' School, Hillingdon, by Mr. J. T. Morton, A.F.R.Ae.S.

Wednesday, February 10th.—Lecture before Dean Close School, Cheltenham, by Flight Lieut. R. E. H. Allen, M.I.Ae.E.

Thursday, February 11th.—Lecture, "Tests of Aircraft Components," by Mr. I. J. Gerard, M.Sc., A.F.R.Ae.S., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Thursday, February 11th.—Lecture before the Gloucester and Cheltenham Branch by a representative of the Marconi Co.

Thursday, February 11th.—Lecture before the Yeovil Branch by Mr. W. Widgery, on "What Model Tests Teach Us."

Thursday, February 11th.—Lecture before Alderman Newton's School, Leicester, by Flight Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.

Friday, February 12th.—Lecture before the Hull and Leeds Branch by Squadron Leader H. W. McKenna, D.C.M., on "The Work of the Armament and Aeroplane Experimental Establishment at Martlesham Heath."

Friday, February 12th.—Lecture before Wyggeston School, Leicester, by Flight Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.

Friday, February 12th.—Lecture before the College of Technology, Leicester, by Flight Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.

Wednesday, February 17th.—Lecture before Cranbrook School by Mr. J. E. Hodgson.

Wednesday, February 17th.—Lecture before Bradfield College by Mr. H. L. Stevens, B.A., A.F.R.Ae.S.

Thursday, February 18th.—Lecture before the Gloucester and Cheltenham Branch by Mr. L. Martin on " Workshop Practice."

Thursday, February 18th.—Lecture before the Yeovil Branch by Major C. J. Stewart, O.B.E., F.R.Ae.S., on " Further Developments in Aircraft Instruments."

Friday, February 19th.—Lecture before the Royal Grammar School, High Wycombe, by Major D. H. Kennedy, O.B.E., F.R.Ae.S.

Friday, February 19th.—Lecture before Cranleigh School by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Friday, February 19th.—Lecture before Rutherford College by Mr. John Bell, A.R.Ae.S.I.

Saturday, February 20th.—Lecture before Royal Masonic School, Bushey, by J. B. H. Rogers, R.A.F.

Tuesday, February 23rd.—Lecture before Epsom College by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Thursday, February 25th.—Lecture, " Catapults," by Mr. P. Salmon, in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Thursday, February 25th.—Lecture before the Yeovil Branch by Flight Lieut. E. A. Healy, on " The Wapiti in England."

Friday, February 26th.—Lecture before St. John's School, Leatherhead, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Saturday, February 27th.—Lecture before Eastbourne College by Mr. S. Scott-Hall, M.Sc., D.I.C., A.F.R.Ae.S.

J. LAURENCE PRITCHARD, *Secretary.*

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

MARCH, 1932

Annual General Meeting

The Annual General Meeting of the Society will be held in the offices of the Society, 7, Albemarle Street, W.1, at 6.30 p.m., on Thursday, March 31st, 1932.

Nominations for Council

Nominations for Council, under Rules 86, 87 and 88, must be received by the Secretary not later than Thursday, March 10th, and must be signed by one supporter and two seconders, who must be voters in the Society, and be accompanied by an intimation in writing from the candidate that he is willing to serve if elected.

Society's Telephone Number

Will all members please note that the telephone number of the Society has been changed from Gerrard 7373 to **Regent 6800?**

Examinations

There will be an examination for the Associate Fellowship and for Associate Membership, which will be held on Friday, April 8th, 1932. The hours of the examinations are:—morning, 10-1; afternoon, 2.30-5.30.

Candidates wishing to sit for the Examination must send in their applications to reach the Secretary by Tuesday, March 8th, and such applications must be accompanied by the Examination Fee. The fee is £2 2s. 0d., and this will not be returned. Any candidate who withdraws his application, or does not attend the Examination, or fails, will be required to pay the fee for a subsequent entry with each further application to be examined.

Alterations to Rules

In addition to the alterations to the Rules for Associate Fellowship, published in the February Monthly Notices, the following alterations to the Rules for Membership, Associate Membership and Associateship, will be put forward by the Council at the Annual General Meeting.

Membership

Rule 9.—No alteration.

Rule 10.—No alteration.

Rule 11.—To read as follows:—*Occupation.*—He shall be actually engaged at the time of his application for election or transfer in a position of responsibility for the design, or construction, or maintenance, or operation of aircraft, aircraft engines, or other essential components or accessories of aircraft or works in connection therewith.

Rule 12.—*Attainments.*—He shall have the qualifications stated in Rules 13(*a*), 13(*b*) and 13(*c*).

Rule 13(*a*).—No alteration.

Rule 13(*b*).—He shall have had five years' employment in positions of responsibility for the design, or construction, or maintenance, or operation of aircraft, aircraft engines, or other essential components or accessories of aircraft or works in connection therewith.

Rule 14(*a*).—To be deleted.

Rule 14(*b*).—To be deleted.

Rule 14(*c*).—To be renumbered 13(*c*).

Rule 15(*a*).—To be deleted.

Rule 15(*b*).—To be deleted.

Associate Membership

Rules 26 and 27.—No alterations.

Rule 28(*a*).—He shall be actually engaged at the time of his application for election or transfer in the design, or construction, or maintenance, or operation of aircraft, aircraft engines, or other essential components or accessories of aircraft or works in connection therewith.

Rule 28(*b*) and 29.—No alterations.

Rule 30.—He shall have had at least three years' employment on the design, or construction, or maintenance, or operation of aircraft, aircraft engines, or other essential components and accessories of aircraft or works in connection therewith.

Rule 31.—To be deleted.

Associateship

Rule 42.—To be deleted.

Meeting of Council

A Meeting of Council was held on Tuesday, February 16th, 1932, in the offices of the Society.

Present: Mr. C. R. Fairey, President, in the chair; Captain P. D. Acland, Major T. M. Barlow, Mr. M. L. Bramson, Mr. Griffith Brewer (Vice-President), Major G. P. Bulman, Captain F. T. Hill, Mr. J. E. Hodgson (Hon. Librarian), Major D. H. Kennedy (Hon. Treasurer), Mr. W. O. Manning, Mr. L. A. Wingfield (Hon. Solicitor) and Mr. McKinnon Wood.

Among the business discussed was the report of the Finance Committee; the report of the Grading Committee; a second report from the Education Committee; the accounts of Aerial Science, Ltd.; the 67th Annual Report of the Council; the agenda for the Annual General Meeting.

Elections

The following recommendations of the Grading Committee were approved by the Council at the meeting on Thursday, February 16th, 1932:—

Associate Fellows.—Donald Lambert Brown, Arthur Stanley Hartshorn, Percy Bertram Humphrey, Theodore Neuman McEvoy (from Student), Krishan Lal Puri.

Associate Member.—Voldemar Post.

Associates.—Harry Arthur Collins, William Howard Garland, Sidney George Nash, Walter Orsborn, Cyril Protheroe, Norman Lynes Walker.

Students.—Douglas Gerald Seafield Grant, Robert Lee Hayes, John Walter Herrick, John Watson Leach, John Kannerleigh Barnett Lee, Arthur Geoffrey Stafford Northcote, Cyril Arthur Osborn, Maxwell Allan Pitts, David Stewart, George Arthur Vigil.

Companions.—Charles John Adamson (from Student), Frederick Walter Rudolph Leistikow.

Subscriptions

Members are reminded that their subscriptions are due on January 1st, 1932. The Society, like all other institutions, is passing through a difficult time, and the Council hope that every member will make every effort to pay his subscription as early as possible in the new year. The rates are:—

	Home. £ s. d.	Abroad. £ s. d.
Fellow	4 4 0	3 3 0
Member	4 4 0	3 3 0
Associate Fellow	3 3 0	2 2 0
Associate Member	3 3 0	2 2 0
Associate	*2 2 0	*2 2 0
Student	1 1 0	1 1 0
Companion	2 2 0	2 2 0
Founder Member	2 2 0	2 2 0

* £1 1s. 0d. without Journal.

Additional Lectures

On Thursday, May 5th, Group-Captain J. E. A. Baldwin, D.S.O., O.B.E., will lecture on "The Training of Pilots and Instructors."

Acknowledgments

The Council wish gratefully to acknowledge a bound volume of *La Revue de l'Aviation*, December, 1906—October, 1908, from Mr. W. O. Manning, Fellow and Member of Council; from Mr. A. Ogilvie a collection of between 300-400 slides of the early history of aviation. Mr. Ogilvie's collection of aeronautical slides, which he has so generously given to the Society, is undoubtedly one of the finest private collections of slides of the early days of aviation that has been made, and it contains many slides which are unique.

The Council very much hope that all members will realise that the Royal Aeronautical Society is the proper depository for papers, photographs and slides of aeronautical interest. They are kept carefully filed and indexed, and are available at any time to their original owners. Many have taken advantage of the fact, and the Society has a collection of slides, photographs and historical papers which is unique. The Council strongly urge any member to contribute to the steadily growing and valuable collection so as to make it as completely representative as possible. There are still many gaps which require filling.

Paris Air Show

The 1932 Paris Air Show, the XIIIth International Aeronautical Exhibition, will be held in the Grand Palais, Paris, from November 25th to December 11th next.

Students' Section

The following rules have been drafted by the Students' Committee. The Students' Section of the Society has rapidly increased in importance in the last

few years, and the Council wish to impress upon every student the importance of supporting their section, not only by attending all students' meetings, but by contributing papers and suggestions and helping the Committee in every way in their power. The Council are keenly anxious that the Students' Section shall become of real value to all those who are beginning in aeronautics. It is upon them that the future of aviation depends and it is to them that the Council look for the future prosperity and power of the Society.

DRAFT RULES.

1. *Title and Constitution.*

(*a*) The name of the Section shall be "The Students' Section, The Royal Aeronautical Society," and its correct abbreviated title "Stud.Sec.R.Ae.S.I."

(*b*) The Section shall consist of every Student Member of the Society.

2. *Objects.*

(*a*) To secure that the best use is made of the special privileges arranged by the Council of the Society for the benefit of Student Members.

(*b*) To encourage Students in the preparation of papers for publication in the JOURNAL of the Society. To encourage such papers to be read and discussed before the Section and to further the competition for the Society's prizes.

(*c*) To promote knowledge in all branches of aeronautical science and to assist the successful advancement of Students to the higher technical grades of the Society.

(*d*) And in any way to further the interests of Students.

3. *Activities.*

(*a*) The Session shall commence in October.

(*b*) There shall be one Annual General Meeting at the commencement of each Session to discuss the affairs of the Section.

(*c*) The Inaugural Address of the Session shall be given by a member of the Parent Body and it shall be followed by a discussion.

(*d*) The Section shall meet at regular intervals throughout the Session when Papers by Students shall be read and discussed.

(*e*) There shall be properly arranged visits to places of interest.

4. *Management.*

(*a*) The affairs of the Section shall be managed by a Committee of Student Officers, consisting of a Chairman, a Vice-Chairman, a Secretary and a group of six elected members.

(*b*) This Committee shall consist of representatives of adjacent aeronautical works and colleges.

(*c*) All Officers shall be elected by ballot at the Annual General Meeting and their term of office shall be one year, but they shall be open for immediate re-election.

(*d*) The Committee shall have the power to fill any casual vacancy which may occur in their number during the year.

(*e*) The Student Chairman shall be in the Chair at all Committee Meetings.

(*f*) The Quorum of the Committee shall be four.

(*g*) All resignations from Office shall be in writing.

5. *Meetings.*

(*a*) At all Meetings, except the Annual General Meeting, the Chairman of the evening shall be a member of the Parent Body and he shall be introduced to the Section by the Student Chairman.

(*b*) The Chair shall be taken by the Student Chairman at the Annual General Meeting.

(*c*) In the absence of the Chairman, the Vice-Chairman shall be in the chair.

(*d*) The Minutes of a Meeting shall be recorded by the Secretary and they shall be approved at the next Meeting before being signed by the Student Chairman.

(*e*) A record of attendances shall be kept of all Meetings. Visitors may be introduced by Members at all Meetings except the Annual General one. Such a visitor *must* sign the Visitors' Book.

(*f*) A report of the activities of the Students' Section shall be made by the Secretary of the Students' Section, in writing, at the end of each Session, to the Secretary of the Society.

(*g*) Nothing in the above rules nor in their interpretation shall be taken as abrogating any of the rules of the Royal Aeronautical Society.

The Committee shall have the power to interpret these Rules in case of dispute of their meaning or effect.

Forthcoming Events

Tuesday, March 1st.—Joint Meeting with the Institution of Automobile Engineers. Mr. C. B. Dicksee on "Some Problems connected with High-Speed Compression-Ignition Engine Development." 7.45 p.m., at Caxton Hall, Westminster, S.W.1.

Wednesday, March 2nd.—Lecture before Brentwood School by Flight Lieut. R. E. H. Allen, M.I.Ae.E.

Thursday, March 3rd.—Lecture before the Yeovil Branch by Mr. R. A. Denne, of Blakeborough & Sons, Ltd.

Thursday, March 3rd.—Lecture before Durham School by Mr. E. G. Richardson, D.Sc., Ph.D., Comp.R.Ae.S.I.

Saturday, March 5th.—Lecture before Reading School by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Saturday, March 6th.—Lecture before Malvern College, by Mr. H. P. Folland, M.B.E., F.R.Ae.S., M.I.Ae.E.

Tuesday, March 8th.—Lecture before the Students' Section by Mr. S. D. Davies on "Performance." In the Library of the Society at 6.30 p.m.

Wednesday, March 9th.—Lecture before Sherborne School, by Mr. Robert Blackburn, O.B.E., F.R.Ae.S., M.I.Ae.E.

Thursday, March 10th.—Lecture before the Yeovil Branch by Sqdn.-Ldr. H. W. McKenna, D.C.M., on "The Work of the Armament and Aeroplane Experimental Establishment at Martlesham Heath."

Saturday, March 12th.—Lecture before Dean Close School, by Flight Lieut. R. E. H. Allen, M.I.Ae.E.

Saturday, March 12th.—Lecture before Highgate School by Mr. R. McKinnon Wood, O.B.E., F.R.Ae.S.

Thursday, March 17th.—Lecture before Royal Grammar School, Newcastle-on-Tyne, by Mr. John Bell, A.R.Ae.S.I.

Thursday, March 17th.—Lecture before the Students' Section, by Mr. F. W. Dowsett on "The Design of Aeroplane Control-Surfaces and Control-Systems." In the Library of the Society at 6.30 p.m.

Friday, March 18th.—Lecture before Balshaw's Grammar School, Lancs., by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

J. LAURENCE PRITCHARD, *Secretary.*

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

APRIL, 1932

Wilbur Wright Memorial Lecture

The 20th Wilbur Wright Memorial Lecture will be delivered by Mr. H. E. Wimperis, C.B.E., M.A., F.R.Ae.S., Vice-President of the Society and Director of Scientific Research at the Air Ministry. The lecture will be delivered in the last week in May and will be preceded by the Annual Council Dinner and Reception by the President and followed by a Conversazione. The actual date and subject of the lecture will be announced in the next issue of the *Journal*.

Meeting of Council

A Meeting of Council was held on Tuesday, March 15th, 1932, in the Offices of the Society.

Present: Mr. C. R. Fairey, President, in the chair. Major T. M. Barlow, Mr. Griffith Brewer (Vice-President), Major J. S. Buchanan, Major D. H. Kennedy (Hon. Treasurer), Captain A. G. Lamplugh, Mr. M. Langley, Mr. W. O. Manning, Mr. A. F. Sidgreaves, Mr. H. E. Wimperis (Vice-President), Mr. L. A. Wingfield (Hon Solicitor).

Among the business discussed was the Report of the Finance Committee; the Report of the Grading Committee; a Joint Lecture with the Institution of the Rubber Industry; the Wilbur Wright Memorial Lecture; and the Civil Air Display.

Elections

The following recommendations of the Grading Committee were approved by the Council at their meeting on Tuesday, March 15th, 1932:—

Member.—Edgar Wikner Percival (from Associate Member).

Associate Fellows.—Walter Richard Jones, Lieut.-Commander the Hon. John Michael Southwell (from Associate), William Lyall Taylor, Hugh Frederick Vessey, Daniel Howell Williams, Richard Zdanowich.

Associate Member.—Krishan Lal Puri.

Associates.—William Guthrie Bertram Clark, Tsaitzu Teshu Mar.

Students.—Albert Godfrey Gooch, William Perrin Lewis, Stanley Alderson Powell-Jones.

Companion.—Kenneth Franklin Tupper (From Student).

Acknowledgments

The Council wish gratefully to acknowledge the following:—From Miss L. M. Corry, a number of aeronautical pamphlets, books and photographs of

the period 1909; and from Mr. W. O. Manning, the Technical Reports of the Inter-Allied Commission on Aeronautical Control in Germany.

Subscriptions

Rule 70 reads as follows:—

"Any Fellow, Member, Associate Fellow, Associate Member, Associate, Student, Companion, or Founder Member, whose subscription shall not have been paid before the first day of April, shall be in arrears of subscription and shall not be entitled to attend or vote at any meeting or to receive any publications to which he would otherwise be entitled."

Under this rule the *Journals* of those members, who have not paid their subscriptions by April 1st, are no longer sent to them. It is not always possible to send back *Journals* to those who pay their subscriptions some time after April 1st, as many of the *Journals* go out of print.

The Council wish to thank all those members who have been prompt this year to pay their subscriptions. The Society, like all other institutions, is passing through a difficult time, and it is only possible to legislate ahead by members supporting the Society in this way.

The following are the rates of subscription:—

	Home.			Abroad.		
	£	s.	d.	£	s.	d.
Fellow	4	4	0	3	3	0
Member	4	4	0	3	3	0
Associate Fellow	3	3	0	2	2	0
Associate Member	3	3	0	2	2	0
Associate	*2	2	0	*2	2	0
Student	1	1	0	1	1	0
Companion	2	2	0	2	2	0
Founder Member	2	2	0	2	2	0

* £1 1s. 0d. without Journal.

Corrections

In Lieut.-Comdr. R. R. Graham's paper on "Safety Devices in the Wings of Birds," published in the January *Journal*, the wing tip slot factors, on page 52, for the Willow Grouse should read 1.9 instead of 2.25, and for the Blackcock 2.0 instead of 0.86.

Forthcoming Events

Thursday, April 7th.—Lecture, "Wing Construction," by Mr. H. J. Stieger, D.I.C., A.F.R.Ae.S., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Wednesday, April 13th.—Lecture before the Paddington Branch of the Junior Imperial League by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Thursday, April 14th.—Lecture, "Aero Engine Accessories," by Mr. W. L. Taylor, A.F.R.Ae.S., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Tuesday, April 19th.—Lecture before the Students' Section by Mr. G. W. Mullett, Honorary Secretary of the Section, on "Torsion of Cylindrical Bars of Non-Circular Cross-Section," in the Library of the Society at 6.30 p.m.

Thursday, April 21st.—Lecture, "Air Port Development," by Mr. Nigel Norman, B.A., A.F.R.Ae.S., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Tuesday, April 26th.—Joint Meeting of the Students' Section of the Society with the Students' Section of the Institution of Electrical Engineers. Lecture on "Radio Communication in Aviation," by Mr. A. D. Hodgson, in the Lecture Hall of the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2, at 6.15 p.m.

Thursday, April 28th.—Lecture, "On the Flight from Germany to Chicago," by Herr Wolfgang Von Gronau, in the Lecture Theatre of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2.

J. LAURENCE PRITCHARD, *Secretary*.

OBITUARY

CAV. E. LANZEROTTI-SPINA, *Associate Fellow*, 1876-1932.

Cavalier Ettore Lanzerotti-Spina, R.I.N.C., Associate Fellow of the Society, who died after a short illness on February 14th, 1932, was born in Sicily in 1876.

Endowed with remarkable physical strength he was, in his youth, a noted athlete, and excelled at wrestling, swimming, fencing and cycling. After graduating at the Nautical University he reached the rank of Naval Captain and Engineer. Attracted towards civil engineering he moved to Paris and became the chief engineer to an automobile firm. Realising that he could not carry out his ideas without a thorough and first hand knowledge of all the tools, machines and processes needed, he took the unusual step of resigning his post and entered the firm of Panhard and Levasseur as a workman, starting from the very bottom.

In 1914 he met Mr. Parry Thomas in Paris and agreed to come to England with him to assist in the development of the Thomas transmission system. With the outbreak of war the E.L.S. Engines, Ltd., was formed to exploit Cavalier Lanzerotti-Spina's remarkable designing abilities. A contract was obtained from the Air Ministry for the construction of two engines of a new type and larger than any in service or construction, known as the Stromboli, a compliment to his native country; these engines were water-cooled, six-cylinder in line, and gave 1,500 h.p. at the very low speed of 900 r.p.m. The cylinders of 12in. bore and pistons with 16in. stroke were a revolutionary advance on anything then existing. The h.p. was 250 per cylinder at a time when no other engineer had attempted more than 60. The pistons were of forged aluminium alloy and the Stromboli was thus directly responsible for the introduction of such pistons for aeroplane engines.

The end of the war put an abrupt end to what appeared to be a promising line of development and Cavalier Lanzerotti-Spina set up as a consulting engineer, continuing his work for the Air Ministry and developing ideas, ahead of his time, which will live and form his true monument. A man of great gifts and one who had real genius for the solution of mechanical problems, his death will leave a gap difficult to fill.

He married in 1916 an English lady who survives him, but he retained his Italian citizenship, and it was on the nomination of the Italian Ambassador in London that he was elevated to the rank of Cavalier. In 1927 he was elected an Associate Fellow of the Society and showed the keenest interest in its work, and was always to be seen at all its functions.

D. H. K.

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

MAY, 1932

Wilbur Wright Memorial Lecture

The 20th Wilbur Wright Memorial Lecture will be delivered by Mr. H. E. Wimperis, C.B.E., F.R.Ae.S., Director of Scientific Research, Air Ministry, on Thursday, May 26th, 1932. Mr. Wimperis will lecture on " New Methods of Research in Aeronautics " and will show a film and slides which are now being specially prepared to illustrate the subject of his lecture.

The lecture will be delivered in the Science Museum, Aeronautical Section, South Kensington, and will be preceded by a reception by the President, Mr. C. R. Fairey, M.B.E., F.R.Ae.S., and followed by a Conversazione.

Conversazione

On Thursday, May 26th, 1932, the Society will hold its annual Conversazione which usually marks the end of the Session. By kind permission of the Director, Colonel Sir Henry Lyons, F.R.S., the Conversazione will be held in the Science Museum, Aeronautical Section, South Kensington, in the immediate neighbourhood of the many historic aircraft which are housed there, the Wright machine, the first power-driven controlled aircraft to fly; the Vickers Vimy, which made the first crossing of the Atlantic in 1919; and many others.

The programme for the evening is approximately as follows:—

8.30 p.m.—9 p.m.—Reception by the President, Mr. C. R. Fairey, M.B.E., F.R.Ae.S., and the Council.

9.15 p.m.—10 p.m.—Delivery of the 20th Wilbur Wright Memorial Lecture by Mr. H. E. Wimperis, C.B.E., F.R.Ae.S., Director of Scientific Research, on " New Methods of Research in Aeronautics."

10 p.m.—midnight.—Conversazione.

There will be a buffet at which members and their guests will be able to obtain refreshments, the cost of which is included in that of their tickets. The Conversazione enables members and their friends to meet in unique surroundings, and the President and Council hope that every member of the Society will make a special effort to attend what is the chief function of the Society's year and make it outstandingly successful. Ladies are specially invited to be present as well as non-members. A number of distinguished personalities in aviation have signified their intention of being present. During the evening the band of H.M. Royal Marines (Chatham Division) will play, by kind permission of the Commandant and officers R.M.

Tickets for the Reception, Lecture and Conversazione (including buffet) are 5/- each, and early application should be made.

Society's Garden (Flying) Party

The President, Mr. C. R. Fairey, and the Council are holding a Garden (Flying) Party at Hanworth on Sunday, June 19th, and they hope that every member of the Society will attend and will bring as many friends as possible.

Provisional arrangements have been made as follows:—There will be a charge of 5/- per head, which will include tea and a flight (as far as weather and arrangements permit) for all those who wish to have one. Each member and his guest will be made a member of the Hanworth Club for the day, so that those who wish can lunch at the club or stay for dinner. Those who wish to do so, however, must give notice of their intention at the time of application for their tickets. There will be a dance band playing in the afternoon, and the band will continue to play in the evening after dinner. There will be a reception by the President and Council in the early part of the afternoon, and many famous flying personalities will be present.

The London Air Park at Hanworth has very extensive grounds, ideally situated, with an excellent club house with all the amenities of a London club, so that it forms a perfect background for the garden party. Full particulars of the party will be sent to every member and published in the Journal of the Society for June. Meanwhile the President and Council hope that every member will make a special note of the date and will make every effort to be present, and make the Garden Party a notable success.

Council Meeting

A meeting of Council was held on Tuesday, April 12th, 1932, in the offices of the Society.

Present: Mr. C. R. Fairey, President, in the chair; the Master of Sempill (Past-President), Professor Bairstow (Vice-President), Mr. Griffith Brewer (Vice-President), Mr. H. E. Wimperis (Vice-President), Major T. M. Barlow, Mr. Robert Blackburn, Major G. P. Bulman, Mr. R. S. Capon, Mr. E. C. Gordon England, Mr. W. S. Farren, Mr. A. H. Hall, Major D. H. Kennedy (Hon. Treasurer), Mr. M. Langley, Mr. W. O. Manning, Mr. R. K. Pierson, Mr. D. R. Pye, Lieut.-Colonel F. C. Shelmerdine, Mr. Lawrence Wingfield (Hon. Solicitor).

Among the business discussed were the arrangements for a Garden Party of the Society at Hanworth; the Wilbur Wright Memorial Lecture; the report of the Finance Committee; the report of the Grading Committee; the report of members in arrears of subscriptions, under Rule 73; a resolution from the Annual General Meeting to reconsider Rule 86; a statement by the Secretary on the slide collection of the Society; and a letter from Sir John Simon, the Foreign Secretary, on the presentation of an illuminated address from the Society to Mr. Harry Guggenheim.

Elections

At the meeting of the Council held on April 12th, 1932, the following were elected:—

Fellows (from Assoc. Fellows).—George Purvis Bulman, Sydney Camm, Arthur Davenport, Eric Cecil Gordon England, Harry Mason Garner, Arthur Henry Hall, Henry Bernon Howard, Ernest John Herbert Lynam, Harold William Sydney Outram, Andrew Robertson, Herbert Lawrence Stevens, George Rudolph Volkert.

Assoc. Fellows.—Edmund Neil Boileau Bentley (from Assoc. M.), Hugh Latimer Dryden, Cyril Frank Uwins.

Associates.—Esmond Brown, Gerard Leslie Gandy, Edward Dixie Keen, Leslie Harvey Bowes Pemberton, Harbans Singh Bawa.

Students.—Leonard Hugh Cooke, Hermann Andrew Hutler, Ivan Grant Murray.

Companion.—Richard Charles London (from Student).

Presentation to Mr. Harry Guggenheim

The Royal Aeronautical Society is deeply indebted to the generosity of the Trustees of the Daniel Guggenheim Fund for the Promotion of Aeronautics. On the inauguration of the fund the Trustees voted the Society the sum of £1,000, which enabled the Council immediately to take steps to place the Society on a firm basis and to inaugurate schemes which had till then been held in abeyance. The Trustees of the fund followed their generous donation with similar amounts for the following four years, a total of £5,000 before the fund was finally closed.

The help which was thus given cannot be overestimated, for it freed the Society, during years of great difficulty, very largely from financial anxiety, and the expenditure which it was enabled to lay out then is one which will be of lasting benefit. The Council prepared an illuminated address for presentation to Mr. Harry Guggenheim, now the Ambassador of the United States of America to Havana, so that he could have a permanent reminder of the help the fund had given to the oldest aeronautical society in the world. This illuminated address was signed by the Patrons of the Society, H.R.H. the Prince of Wales and H.R.H. the Duke of York, the President (at the time), Colonel the Master of Sempill, the President-elect, Mr. C. R. Fairey, and the Secretary, Captain J. Laurence Pritchard.

Arrangements were made by the Master of Sempill, through the courtesy of the Foreign Office, to present the address through His Majesty's Minister to Cuba, and the following is a copy of a letter received from Sir John Simon, the Foreign Minister:—

Foreign Office, S.W.1,
April 2nd, 1932.

Dear Sempill,

I have now received from His Majesty's Minister at Havana a report on the presentation to the Ambassador of the United States of America of the illuminated memorial forwarded by you on behalf of the Royal Aeronautical Society in your letter of the 16th January last.

Sir J. Broderick reports that on the 27th February last, at 10 a.m., Mr. Guggenheim came to His Majesty's Legation for the purpose of receiving the memorial, accompanied by Lieutenant Elwood Quesada, Air Attaché to the United States Embassy. Sir J. Broderick was accompanied by the members of the staff of His Majesty's Legation. In presenting the memorial His Majesty's Minister referred briefly to the history of the Royal Aeronautical Society and to the work in furthering the science of civil aviation that had been carried out as a result of the munificence of the late Mr. Daniel Guggenheim and the energetic interest of his son. The Ambassador, who was obviously greatly pleased at the compliment paid him by the Royal Aeronautical Society, spoke in graceful terms of the unique position occupied in the aeronautical world by that Society. He stated that each nation had its airmen pioneers who were the " fathers of aviation," but that the " Royal Aeronautical Society " was universally recognised as the mother of the science. When his father had instituted the Guggenheim Fund it had been one of

the first thoughts of the Trustees to visit the Society and place in its hands a donation from the fund, which they knew that the mature experience of the Society would apply with especially wise judgment.

Yours very sincerely,

(Signed) JOHN SIMON.

The following letter was received from Mr. Harry F. Guggenheim by the Society, through Major R. H. Mayo, who was the European representative of the Daniel Guggenheim Fund in Europe:—

"I recently had the very great pleasure to receive from the hands of my colleague, the British Minister to Cuba, a memorial from the Royal Aeronautical Society, signed by their Royal Highnesses the Prince of Wales and the Duke of York, the President, the President-Designate and the Secretary of the Society.

I formally accepted the memorial from the British Minister and made my formal acknowledgment to him. However, I am writing to express my deep personal appreciation to you and your associates for the gracious and thoughtful act of the Society. I was deeply touched by the memorial to my father, and I assure you it will be something that my family will always treasure.

Sincerely yours,

HARRY F. GUGGENHEIM."

Civil Air Display

The Guild of Air Pilots and Air Navigators of the British Empire are organising a Civil Air Display, to take place at Brooklands on Friday and Saturday, May 27th and 28th.

The object of the organisers is to provide a counterpart of the Royal Air Force Display, with civil type aircraft, and initiate an annual event of primary importance to the whole aircraft industry.

Efforts are being made to make the display representative of all types of civil aircraft, both British and foreign, and it is anticipated that representatives of several countries will be present with their aircraft.

The Friday programme will include a full rehearsal of Saturday's two-hour flying display, and admission on this day will be by invitation only—to the Press and members of the aircraft industry and those allied to it.

Saturday's flying display will commence at 1.30 p.m. with the London-Newcastle Race for the Newcastle "Evening World" Trophy, other items will include Pylon Racing and a Concours d'Elegans for visiting pilots.

The Royal Air Force have promised to supply an aerobatic item with one flight of machines.

Admission to the enclosures will be 5/- and 2/6—motors 2/6. Tickets may be obtained in advance from the offices of the Society, or from Keith Prowse, and all the Light Aeroplane Clubs.

Akroyd Stuart Lectures

The closing date for the receipt of papers for the Akroyd Stuart Prize is June 30th, 1932. The prize is given for the best paper received or lecture read or given before the Society on the Origin and Development of Heavy Oil Aero Engines. The prize is open to members and non-members and its value is approximately £68.

Acknowledgments

The Council wish gratefully to acknowledge the gift of a number of pamphlets and photographs from Mr. W. O. Manning to the Society's historical collection; from Captain F. L. M. Boothby, an interesting collection of old airship photographs and postcards; from Lord Hardwick, a copy of the Atmotic ship, with coloured plates, published in Sydney, 1851; and from Lieut.-Comdr. the Hon. J. M. Southwell, two recognition books of wartime aircraft.

Annual General Meeting

The Annual General Meeting of the Society was held on 31st March, 1932, in the Library of the Society.

Present:—Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President), in the chair. Council: Mr. Griffith Brewer, F.R.Ae.S. (Vice-President), Messrs. P. D. Acland, T. M. Barlow, G. P. Bulman, D. H. Kennedy (Honorary Treasurer), M. Langley, W. O. Manning and L. A. Wingfield (Honorary Solicitor). Ordinary Members: Flight Lieut. R. E. H. Allen, Mr. G. N. Ashcroft, Mr. C. G. Brewer, Mr. R. L. Carter, Wing Commander T. R. Cave-Browne-Cave, Mr. F. J. Cleveland, Capt. A. T. E. Eadon, Mr. H. W. Franklin, Group Capt. G. B. Hynes, Flight Lieut. R. Chevalier Preston and Lieut. Comdr. the Hon. J. M. Southwell. Captain J. Laurence Pritchard, Secretary. Staff: Miss Jarvis, Miss Todd and Miss Voice.

The Secretary read the notice convening the meeting.

The President, in opening the meeting, reviewed the year's activities as detailed in the Council's Annual Report, published in the Journal of March, 1932. He laid stress upon the fact that the year under review had been one of exceptional financial depression, but even so the Society had been able to maintain a solvent position, and the increase of the Endowment Fund had been greater during this particular period than at any other time. The President impressed upon those present, however, the great necessity for keeping the fund constantly in mind, as it was of vital importance that the Society should eventually be able to maintain an independent financial position. In the meantime the Council wished to express their cordial thanks and appreciation of the grants received from the Air Ministry, the Society of British Aircraft Constructors and the Society of Motor Manufacturers and Traders.

The President drew attention to many encouraging features in the Annual Report, including a definitely increasing membership, a series of valuable and well attended lectures, and a flourishing Students' Section. In addition the Council had to report highly successful results of the scheme for lectures before the Public Schools, and in this connection very cordial thanks were due to Mr. W. O. Manning for the great help he had given in inaugurating the scheme.

The President paid a special tribute to the flourishing work of the various Branches of the Society and to the Honorary Officers. Major D. H. Kennedy, the Chairman of the Finance Committee, had been largely instrumental in directing the Society's finances so as to ensure the maximum efficiency with the minimum expenditure. Mr. J. E. Hodgson had again given freely of his knowledge and experience as Honorary Librarian. Mr. Lawrence Wingfield had given invaluable help to the Society on all legal questions, and particularly in the formation of Aeronautical Trusts, Ltd., and new Articles of Association for Aerial Science, Ltd., all of which had involved a considerable amount of time and work. To Mr. Norman Smith, the Honorary Accountant, the Council owed a deep debt of gratitude, and particularly for his help in regard to Income Tax problems.

After commenting on the efficiency of the staff, the President paid a striking tribute to the Secretary, Captain J. Laurence Pritchard, to whose ability, energy and enthusiasm the Society owed a deep debt of gratitude. In fact, he could

be considered the mainstay of the Society. The increasing interest and importance of the Journal and its value as an advertising medium was only one instance of the outstanding merits of the Secretary and his staff, and the Council wished to place on record their great appreciation.

The President concluded his speech by thanking the members of Council and Committees for their hard work during the year.

The following resolution was moved by Flight Lieut. Allen :—

> "That the proposed alterations to the rules for Membership, Associate Fellowship, Associate Membership and Associateship, as printed in the Agenda of the Annual General Meeting of 31st March, 1932, be accepted."

The resolution was seconded by Capt. A. T. E. Eadon and carried unanimously.

Messrs. Acland, Barlow and Carter were appointed scrutineers for the ballot for election of new Members of Council for 1932-34.

As a result of the ballot the following were elected to fill the vacancies on the Council :—

> Professor L. Bairstow, Air Marshal Sir H. R. M. Brooke-Popham, Major G. P. Bulman, Mr. R. S. Capon, Mr. E. C. Gordon England, Mr. W. S. Farren, Mr. R. K. Pierson, Mr. D. R. Pye, Mr. E. F. Relf, and Professor R. V. Southwell.

On the proposal of Major Kennedy, seconded by Major Barlow, Messrs. Price, Waterhouse and Co. were elected as Auditors for Aerial Science, Ltd., and Aeronautical Trusts, Ltd., for the ensuing year.

Major Kennedy raised the question as to whether it would be possible to delete the clause in Rule 86 which was passed by the previous Annual General Meeting, to the effect that Council members could not continue in office for more than four years in succession. The matter was referred to the next meeting of Council.

The business of the meeting being concluded, Mr. Wingfield proposed a cordial vote of thanks to the Chairman, Mr. Fairey, who, as President of the Society, had more than upheld the traditions of his predecessors. When Mr. Fairey took office he had referred with characteristic modesty to the difficulty he felt in following such a President as the Master of Sempill. Mr. Wingfield remarked that under the rules no future President could serve for such a long period as Colonel Sempill had done, but during the first year of his office Mr. Fairey had in every way fulfilled the hopes that were entertained of him in carrying on the good work, not the least part of which was the considerable financial advancement of the Society. It was due to Mr. Fairey's generosity in giving the original £100 that the Council were able to present the Endowment Fund appeal in such a way as to bring in no less than £500 during the year. This was all the more gratifying in view of the general depression during that period, and the Council hoped that the appeal would continue to bring in still more and more as times improved. Mr. Wingfield further referred to the personal generosity of the President in entertaining distinguished visitors and lecturers from abroad, and in meeting the deficit on the Wilbur Wright Lecture and Conversazione. The President had, in fact, gone out of his way to be generous, and in a general way had done all he could in the direction of personal interviews and negotiations, to back up the Council and the Society. To have such strong support from the President in all these ways was particularly appreciated by those, such as secretaries and other officers, who had to run any society or institution, as without such support their work would be unavailing.

Captain Acland seconded the vote of thanks, and the President expressed his great appreciation of all that had been said. He had felt it a great honour and pleasure to be President of the Royal Aeronautical Society. He could have wished times had been more propitious during his term of office, but he hoped it would not be long before the Society was in a sound financial position. In his office as President he had been helped considerably by the Council and officers, and he felt sure that when his time was up the tradition would be carried forward with the same hearty co-operation.

Forthcoming Events

Thursday, May 5th.—Lecture, " The Training of Pilots and Instructors," by Group Captain J. E. A. Baldwin, D.S.O., O.B.E., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Sunday, May 22nd.—Lecture before Marlborough College by Mr. C. R. Fairey, M.B.E., F.R.Ae.S., President of the Society.

Tuesday, May 24th.—Lecture before the Students' Section by Mr. G. A. Vigil, B.Eng., on " Carburettors," in the Library of the Society, at 6.30 p.m.

Thursday, May 26th.—Wilbur Wright Memorial Lecture by Mr. H. E. Wimperis, C.B.E., F.R.Ae.S., Vice-President of the Society, on " New Methods of Research in Aeronautics "; the Lecture to be followed by a Conversazione in the Science Museum, South Kensington.

J. LAURENCE PRITCHARD, *Secretary.*

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

JUNE, 1932

Society's Garden (Flying) Party

The President, Mr. C. R. Fairey, and the Council are holding a Garden (Flying) Party at Hanworth Air Park on Sunday, June 19th, and they hope that every member of the Society will make a special effort to attend and bring as many friends as possible.

The Garden Party has been arranged with the primary intention of enabling members of the Society and their friends to meet under pleasant conditions and enjoyable surroundings. The London Air Park at Hanworth has very extensive grounds, situated in ideal surroundings and gardens, with an excellent club house which has all the amenities of a London club, including a large ball-room, so that it will form a perfect background for the Garden Party. Each applicant for a ticket will be made an honorary member of the club for the day so that those who wish can take full advantage of the facilities the club can offer them, and have lunch at the club or supper if they wish. Those who wish to do so, however, must give notice of their intention at the time of their application for tickets. There will be a dance band playing in the afternoon, and the band will continue to play in the evening after dinner for those who wish to stay.

The Garden Party will begin at three o'clock with a reception by the President and Council, after which an opportunity will be given to members and their friends to fly. From 3.30 to 4.0 the aircraft from which flights will be made will be lined up for inspection in front of the hangars, and during that time the pilots of National Flying Services will make aerobatic flights.

Manufacturers have kindly promised to send machines specially for the party, and among them will be most of the light aeroplanes, Fury, Firefly, Atlas Mark II, Avro Cadet 631 and advanced trainer 626, A.W. 16, Westland Wessex, and the Fairey Long Range machine.

Members and their friends, who apply for tickets, will be provided with badges divided into two parts, one entitling them to membership of Hanworth club for the day and tea, and the other to a flight (weather and circumstances permitting). The second half of the badge *must* be exchanged for a flight voucher by those wishing to have a flight. *They will not be transferable,* and must bear the name of the guest or member. Every applicant for a ticket will be provided with a map of the route to Hanworth, for those who come by car, and a list of trains from Waterloo for those who come by train. The time from Waterloo is about 25 minutes. No one will be admitted at the gates of the park unless they are wearing their badge. A free car park will be provided for those coming by road.

Those who wish to have lunch at the club or supper must signify their intention to do so, either at the time of their application for their tickets or direct to the Secretary of the Hanworth Club, London Air Park, Feltham, Middlesex,

before noon on Friday, June 17th, so that accommodation can be reserved. It will not be possible to guarantee either meal without notification. Lunch will be served from 12.30 p.m. to 2.30 p.m, price 3s. 6d., and supper from 7.15 p.m. to 8.30 p.m., price 5s.

Ladies are specially invited by the President and Council to be present at the Garden Party. The President hopes that every member will make a special note of the date and will make every effort to attend to make the party a notable success.

The tickets (including tea and a flight) are 5/- each. Application for tickets cannot be received after Thursday, June 16th.

Council Meeting

A Meeting of Council was held on Tuesday, May 10th, 1932, in the Offices of the Society.

Present: Professor L. Bairstow (Vice-President) in the chair. Mr. Griffith Brewer (Vice-President), Major T. M. Barlow, Sir R. H. Brooke-Popham, Major G. P. Bulman, Mr. R. S. Capon, Mr. W. S. Farren, Mr. A. H. Hall, Mr. J. E. Hodgson (Honorary Librarian), Major D. H. Kennedy (Honorary Treasurer), Mr. M. Langley, Mr. W. O. Manning, Mr. D. R. Pye, Mr. E. F. Relf, Mr. A. F. Sidgreaves, Professor R. V. Southwell, Mr. H. E. Wimperis (Vice-President) and Mr. L. Wingfield (Honorary Solicitor).

Among the business transacted was the Report of the Special Rules Committee, appointed to consider a resolution from the Annual General Meeting to suspend the rules dealing with the election of the President and the Council for a fixed period; the Report of the Finance Committee; the Report of the Grading Committee; and the award of the Bronze Medal.

Award of the Bronze Medal

The Council at their meeting on May 10th unanimously decided to award the Bronze Medal of the Society to Mr. T. W. K. Clarke, *Associate Fellow*, for his work in furthering the progress of aeronautics.

Elections

At the meeting of Council, held on May 10th, 1932, the following were elected, following recommendations from the Grading Committee:—

Fellows.—Leonard Charles Bygrave (from Assoc. Fellow), Juan de la Cierva (from Assoc. Fellow), William Lewis Cowley (from Member), Leslie George Frise (from Assoc. Fellow), Henry Braid Irving (from Assoc. Fellow), Christopher Noel Hunter Lock (from Assoc. Fellow).

Associate Fellows.—Ernest William Bliss, Vivian Gwilym Jones (from Associate), Air Commodore Duncan LeGeyt Pitcher.

Associate Member.—Alfred Charles Morris Jackaman.

Associate.—Frederick George Spicer.

Students.—Cyril Leonard Bessey, Hubert William Jordan Brittlebank, Maurice Herrod-Hempsall, John Cecil Longman, Damodar Narhar Thakar.

Companion.—John Townend.

Akroyd Stuart Lectures

The closing date for the receipt of papers for the Akroyd Stuart Prize is June 30th, 1932. The prize is given for the best paper received or lecture read

or given before the Society on the Origin and Development of Heavy Oil Aero Engines. The prize is open to members and non-members and its value is approximately £68.

Acknowledgments

The Council gratefully acknowledge the gift of a number of photographic postcards of airships from Captain F. L. M. Boothby, R.N. Captain Boothby has generously given a large collection of photographs, papers and pamphlets dealing with airships to the Society and thereby greatly strengthened the historical section on the airship side. The Council also wish to acknowledge the gift of a photograph, full size, of the folding plate in the first edition of a "Treatise on the Art of Flying," by Thomas Walker, from the Director of the Municipal Museums, Hull; and from Messrs. Vickers, Ltd., the film of Squadron Leader MacLaren's flight in 1924.

Membership Badges

For those members of the Society who wish to have them, a badge has been prepared. The badge shows the symbols of the Society, the peregrine and balloon, in finely chased gilt on a blue enamel background, surrounded by a royal blue border on which appears the lettering "The Royal Aeronautical Society, 1866." The badges are hand made with the greatest care so that they will always retain their original appearance, and it is hoped that members will wear them on all suitable occasions. The price is 5/-, or 5/3 post free.

Correction

The paper by Mr. Denne, published in the May Journal was read before the Yeovil Branch, and not the Bristol Branch as stated.

Forthcoming Events

Thursday, 9th June.—Special General Meeting in the Library of the Society at 6.30 p.m.

Sunday, 19th June.—Garden (Flying) Party of the Society at the London Air Park, Hanworth, 2.30 to 7 p.m.

J. LAURENCE PRITCHARD, *Secretary.*

THE

ROYAL AERONAUTICAL SOCIETY

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MONTHLY NOTICES

JULY, 1932

President

Mr. C. R. Fairey was elected President of the Society for the year 1932-33 at the Council Meeting held on June 22nd, 1932.

This is the third year of office of Mr. C. R. Fairey. Under Rule 71 no President may serve for more than two years in succession. The rule was suspended for the two years 1933-34 at a Special General Meeting held on Thursday, June 9th. The Council, in putting forward the proposed suspension of the rule, had in mind the re-election of Mr. Fairey, who has taken such a keen and practical interest in the welfare of the Society and has devoted an immense amount of his valuable time to the Society's affairs. Under Mr. Fairey's guidance the Society is making that steady progress which is leading to its whole future being placed on a firm basis and one can look forward to the certainty that when he lays down the reins of office he will have fulfilled, despite the great difficulties which are being faced from a financial point of view, his ambition to leave the Society in a stronger position than when he first became President.

Vice-Presidents

The following were elected Vice-Presidents of the Society for the year 1932-33, at the Council Meeting held on June 22nd, 1932:—

Professor L. Bairstow (re-elected).
Air Marshal Sir Robert Brooke-Popham.
Mr. A. F. Sidgreaves.

Council Meeting

A Meeting of Council was held on Wednesday, June 22nd, 1932, in the offices of the Society.

Present: Mr. C. R. Fairey, M.B.E., F.R.Ae.S., in the chair. Major T. M. Barlow, Mr. Griffith Brewer (Vice-President), Air Marshal Sir Robert Brooke-Popham, Major G. P. Bulman, Mr. R. S. Capon, Mr. E. C. Gordon England, Mr. A. H. Hall, Mr. J. E. Hodgson (Honorary Librarian), Major D. H. Kennedy (Honorary Treasurer), Mr. W. O. Manning, Mr. R. K. Pierson, Colonel the Master of Sempill (Past-President), Mr. R. McKinnon Wood.

Among the business transacted was the report of the Finance Committee; the report of the Grading Committee; the report of the Special General Meeting; the election of the President for 1932-33; the election of Vice-Presidents for 1932-33; the Lecture Programme for the 1932-33 Session.

Elections

At a Meeting of Council held on June 22nd, 1932, the following were elected:—

Fellows (from Assoc. Fellows).—Thomas Wigston Kinglake Clarke, Harold Grinsted.

Associate Fellows.—Alfred Gordon Berg (from Companion), William Evelyn Patrick Johnson, Kenneth Wilson Marshall (from Student), Albert Cyril Shaw (from Student), Richard Pratt Targett-Adams, Harry Barlow Walker.

Associate Member.—Robert Ashton.

Associate.—Francis Guy Boreham.

Students.—Michael O'Bryen Shute Barrington, Hector Leo Cruickshank, Anail Chandra Mitter, Peter Herbert Rayner, Norman Peter Reason, Gursharn Singh, Kenneth Elliott Walters, Alexander Robert Wright.

Companion.—Frederick Edward Guest.

Wilbur Wright Memorial Lecture

The Twentieth Wilbur Wright Memorial Lecture was held in the Aeronautical Section of the Science Museum, South Kensington, on Thursday, May 26th. The lecture, by Mr. H. E. Wimperis, C.B.E., M.A., Fellow and Vice-President of the Society, was on "Some New Methods of Research in Aeronautics." The chair was taken by Mr. C. R. Fairey, M.B.E., F.R.Ae.S., President of the Society. The lecture was illustrated with a film and slides.

The lecture was preceded by the Council Dinner at which the following were present:—

Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President), in the chair.
The Master of Sempill, A.F.C., F.R.Ae.S. (Immediate Past-President).

GUESTS.

Mr. H. E. Wimperis, C.B.E., M.A., F.R.Ae.S. (Vice-President).
Miss Amelia Earhart (Mrs. G. P. Putnam), the first lady guest ever invited to the Council Dinner.
The Most Honourable the Marquess of Londonderry, K.G., M.V.O., Secretary of State for Air.
Air Vice-Marshal H. C. T. Dowding, C.B., C.M.G., Air Member for Supply and Research.
Sir Richard T. Glazebrook, K.C.B., F.R.S., F.R.Ae.S., Chairman of the Aeronautical Research Committee.
Sir Joseph E. Petavel, K.B.E., D.Sc., F.R.S., F.R.Ae.S., Director of the National Physical Laboratory.
Mr. H. T. Tizard, C.B., A.F.C., F.R.S., F.R.Ae.S., Rector of the Imperial College of Science and Technology.
The Right Hon. Lord Gorell, C.B.E., M.C., M.A., Chairman of the Royal Aero Club.
Mr. J. D. Siddeley, C.B.E., F.R.Ae.S., Chairman of the Society of British Aircraft Constructors.
Lieut.-Colonel M. O'Gorman, C.B., D.Sc., M.Inst.C.E., F.R.Ae.S., Vice-President, Fédération Aéronautique Internationale.
Captain H. C. Rawlings, D.S.O., R.N., Air Officer Commanding the Fleet Air Arm.
Mr. F. W. Lanchester, LL.D., F.R.S., M.Inst.C.E., Hon.F.R.Ae.S.
Mr. Arthur J. Barratt, K.C., Counsellor to the American Embassy.

Major F. M. Scanlon, American Military Attaché for Air.
Colonel H. Nerincx, Belgian Military Attaché.
Captain M. J. B. Davy, A.F.R.Ae.S.
Major B. F. S. Baden-Powell, F.R.A.S., F.R.Met.Soc., Hon.F.R.Ae.S.
Colonel Sir Henry Lyons, Hon.D.Sc., F.R.S.

VICE-PRESIDENTS.

Lieut.-Colonel J. T. C. Moore-Brabazon, M.C., M.P., F.R.Ae.S., M.I.Ae.E., Vice-President of the Royal Aeronautical Society.
Professor L. Bairstow, C.B.E., F.R.S., F.R.Ae.S., Vice-President of the Royal Aeronautical Society, Zarahoff Professor of Aeronautics, London University.
Mr. Griffith Brewer, F.R.Ae.S., Vice-President of the Royal Aeronautical Society.

COUNCIL.

Major T. M. Barlow, M.Sc.(Eng.), M.Inst.C.E., M.I.Mech.E., F.R.Ae.S.
Mr. Robert Blackburn, O.B.E., F.R.Ae.S., M.I.Ae.E.
Major G. P. Bulman, O.B.E., F.R.Ae.S.
Mr. R. S. Capon, O.B.E., B.A., F.R.Ae.S.
Mr. E. C. Gordon England, F.R.Ae.S.
Mr. W. S. Farren, M.B.E., F.R.Ae.S., M.I.Ae.E.
Mr. A. H. Hall, C.B.E., M.Inst.C.E., M.I.Mech.E., F.R.Ae.S.
Mr. J. E. Hodgson, Comp.R.Ae.S.I. (Hon. Librarian).
Major D. H. Kennedy, O.B.E., F.R.Ae.S. (Hon. Treasurer).
Mr. M. Langley, A.M.I.Ae.E., Assoc.M.Inst.N.A.
Mr. W. O. Manning, F.R.Ae.S.
Mr. R. K. Pierson, M.B.E., B.Sc., Assoc.M.Inst.C.E., F.R.Ae.S.
Mr. D. R. Pye, M.A., F.R.Ae.S.
Mr. A. F. Sidgreaves, O.B.E., Comp.R.Ae.S.I.
Mr. Lawrence A. Wingfield, M.C., D.F.C., A.R.Ae.S.I. (Hon. Solicitor).
Captain J. Laurence Pritchard, Hon.F.R.Ae.S. (Secretary).

Before the reading of the Wilbur Wright Memorial Lecture the President referred to the honour conferred upon the Society by the presence of Lord Londonderry, the Secretary of State for Air, and Miss Amelia Earhart, who had so recently made the first solo Trans-Atlantic flight ever attempted by a woman. Mr. Fairey next presented to Mr. T. W. K. Clarke, an Associate Fellow of the Society, the Society's Bronze Medal, awarded for Mr. Clarke's pioneer work in the science of aeronautics. The medal had only been awarded twice previously—to Dr. F. W. Lanchester in 1909 and to Mr. B. G. Cooper, a former Secretary of the Society, in 1910.

Immediately following the reading of the lecture the Society held a Conversazione in the Science Museum, a very large number of the Society's members and friends, and many distinguished guests, being present. During the evening, by kind permission of the Commandant and Officers, R.M., the band of H.M. Royal Marines (Chatham Division) played selections, conducted by Captain P. G. S. O'Donnell, M.V.O., Mus.B.(Oxon), L.R.A.E. A full list of those who attended the Conversazione will be published in a future issue of the Journal.

The following letter has been received from the Secretary of State for Air:—

> Dear Mr. Fairey,—I write to thank you and the Council of the Royal Aeronautical Society for a most enjoyable evening last night. I was very pleased to have such an agreeable occasion for meeting the members of the Council, and Mr. Wimperis's lecture was most interesting.—Yours sincerely, LONDONDERRY.

Society's Garden Party

The Garden Party held by the President, Mr. C. R. Fairey, and the Council at Hanworth on Sunday, June 19th, proved to be a great success. Over 600 members of the Society and their guests attended the party and of these 440 took advantage of the occasion to have a flight. This is the largest gathering of members and their friends in the history of the Society. The Garden Party was in the nature of an experiment and it was not foreseen how popular it would be. It is hoped to hold a similar function next year, and with the experience which has been gained this year to provide a programme of flying and to arrange the function in other ways which will make it the outstanding and most enjoyable event of the year.

A full list of those who attended the Garden Party and those who flew will be published in an early issue of the Journal.

Membership Badges

For those members of the Society who wish to have them, a badge has been prepared. The badge shows the symbols of the Society, the peregrine and balloon, in finely chased gilt on a blue enamel background, surrounded by a royal blue border on which appears the lettering " The Royal Aeronautical Society, 1866." The badges are hand made with the greatest care so that they will always retain their original appearance, and it is hoped that members will wear them on all suitable occasions. The price is 5/-, or 5/3 post free.

J. LAURENCE PRITCHARD, *Secretary.*

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

AUGUST, 1932

Conversion Loan

In conformity with the action taken by other scientific Societies and Institutions, the Council have converted the whole of the holding of the Society's 5% War Stock into the new 3½% War Stock. The effect of this cannot be fully foreseen at the moment. It will definitely reduce the total income received from investments by over £100 per annum, and may have an effect on the annual value of the prizes offered by the Society. The Council have these effects under close consideration.

The President and Council have had an opportunity at the close of the half-year to examine the accounts of the Society, and they wish particularly to thank all those members who have supported the Society at a time of great difficulty. The President and Council are only too well aware of the fact that many members have to scrutinise with particular care their subscriptions to any Society to which they belong, and they view with the greatest satisfaction the fact that an overwhelming majority of members of the Royal Aeronautical Society have made a special effort this year to retain their membership.

Every expense is most carefully scrutinised by a strong Finance Committee each month and the administrative expenses of the Society are lower than those of any similar body, and less than half of most Societies and Institutions. It is only by constant attention to the necessary overhead charges that it is possible for the Council to keep up the high standard of the Journal and Lectures which has been aimed at during the past few years. The support of members of the Society has enabled that standard to be maintained despite the general world situation, and due to that support the Council have every confidence that the Society will continue to make steady progress.

Membership Badges

For those members of the Society who wish to have them, a badge has been prepared. The badge shows the symbols of the Society, the peregrine and balloon, in finely chased gilt on a blue enamel background, surrounded by a royal blue border on which appears the lettering "The Royal Aeronautical Society, 1866." The badges are hand made with the greatest care so that they will always retain their original appearance, and it is hoped that members will wear them on all suitable occasions. The price is 5/-, or 5/3 post free.

Students' Section

The Students' Section of the Society, under the able and energetic guidance of its Chairman, Honorary Secretary and Committee, had an excellent session of 1931-1932.

The inaugural address was given by Professor L. Bairstow, F.R.S., C.B.E., F.R.Ae.S., Vice-President of the Society, on November 17th, 1931, on "Applications of Aeronautical Research." In the chair, Mr. E. Relf, A.R.C.S., F.R.Ae.S.

The following lectures were given :—

February 29th, 1932.—"The Fundamental Principles of Aircraft Stressing," by Mr. D. Hay Surgeoner. Chairman, Dr. H. F. Winny, B.Sc.

March 8th, 1932.—"An Introduction to Aircraft Performance Calculations," by Mr. S. D. Davies, B.Sc. Chairman, Dr. H. F. Winny, B.Sc.

March 17th, 1932.—"Some Notes on the Design of Aeroplane Control Surfaces and Control Systems," by Mr. W. F. Dowsett. Chairman, Mr. H. E. Wimperis, C.B.E., M.A., F.R.Ae.S., Vice-President of the Society.

April 19th, 1932.—"Torsion of Cylindrical Bars of Non-circular Section," by Mr. G. W. Mullett, Wh. Sch., D.I.C. Chairman, Dr. H. Roxbee-Cox, B.Sc., D.I.C., A.F.R.Ae.S.

May 24th, 1932.—"Carburettors," by Mr. G. A. Vigil, B.Eng. Chairman, Mr. D. R. Pye, M.A., F.R.Ae.S., Member of Council.

The average attendance at the lectures was twenty.

In addition to the above lectures, visits were paid to Vickers (Aviation) Ltd. at Weybridge on April 23rd, 1932, at which the attendance was sixty-five; and to the Aerodynamics Department of the National Physical Laboratory at Teddington on July 2nd, 1932, at which the attendance was thirty-six. These two visits were very great successes and it is hoped to arrange a number more for next session.

On November 3rd, 1931, the Annual General Meeting of the Students' Section was held and the following officers elected :—

Chairman: H. F. Winny, Ph.D., D.I.C.

Secretary: G. W. Mullett, Wh. Sch., D.I.C., G.I.Mech.E.

Committee: J. P. Bertinat, S. D. Davies, B.Sc.(Eng.), V. A. R. French, V. H. F. Hopkins, G. V. Hayns, B.A., H. G. Stokes and J. E. Walker.

The Council are very gratified at the activities of the Students' Section, and they appeal to all Students to do their utmost to attend the meetings and visits arranged for them, through the excellent work of the Chairman, Secretary and Committee. The Students are the future members of the Society upon whom the high reputation of the Society will rest, and it is hoped that they will make every effort to back up their Committee, not only by attendance at lectures, but by suggestions for these lectures and for the general welfare of the Section.

J. Laurence Pritchard, *Secretary*.

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ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

SEPTEMBER, 1932

Lecture Programme

The following lectures have been arranged for the coming Session:—

Thursday, October 6th.—Captain N. MacMillan, M.C., A.F.C., A.F.R.Ae.S., "Air Navigation." Joint Lecture with the Guild of Air Pilots.

Thursday, October 20th.—Flight Lieutenant W. G. Pudney, "Flying Conditions on the West Coast of Africa."

Thursday, November 3rd.—H. G. Travers, D.S.C., "Civil Primary Training."

Thursday, November 10th.—D. L. Hollis Williams, B.Sc., A.F.R.Ae.S., "Airscrew Design."

Thursday, November 24th.—Squadron Leader H. Leedham, O.B.E., "The Evolution of Aircraft Wireless Equipment."

Thursday, December 1st.—A. Fage, A.R.C.Sc., F.R.Ae.S., "The Behaviour of Fluids in Turbulent Motion."

Thursday, December 8th.—Lieut. J. S. A. Salt, R.E., "Air Survey."

Thursday, December 15th.—Squadron Leader R. S. Booth, A.F.C., R.A.F., "Airship Development Abroad."

Thursday, February 2nd.—A. Plesman, "The Operation of Aircraft Over Tropical Routes."

Thursday, March 23rd.—H. M. Garner, M.A., F.R.Ae.S., "Seaplane Research."

During the first half of the Session Dr. Dornier will lecture on the lessons of the Do. X, and during the second half Wing Commander G. S. Marshall, O.B.E., M.R.C.S., L.R.C.P., will lecture on "Some Aspects of the Medical Side of Aviation."

Further lectures are being arranged and will be announced as dates are fixed.

Examinations

The next examinations for the Associate Fellowship and Associate Membership of the Society will be held in the Offices of the Society on Friday, December

30th, 1932, between the hours of 10 a.m. and 5.30 p.m. These examinations will be the last of the examinations under the present syllabus. The new syllabus, which comes into force on January 1st, 1933, is at present under consideration by the Examinations' Committee and will be printed shortly.

Membership Badges

For those members of the Society who wish to have them, a badge has been prepared. The badge shows the symbols of the Society, the peregrine and balloon, in finely chased gilt on a blue enamel background, surrounded by a royal blue border on which appears the lettering "The Royal Aeronautical Society, 1866." The badges are hand made with the greatest care so that they will always retain their original appearance, and it is hoped that members will wear them on all suitable occasions. The price is 5/-, or 5/3 post free.

J. LAURENCE PRITCHARD, *Secretary.*

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

OCTOBER, 1932

Public School Lectures

As last year a number of lectures have been arranged, chiefly before the Public Schools, and the Council wish particularly to thank those members of the Society who have undertaken to deliver the lecture which has been prepared.

The standard lecture is entitled " The Uses of the Aeroplane " and is illustrated with slides. The lecture covers mail and passenger carrying, goods carrying, air survey work, fire fighting and forest patrol, crop dusting and crop protection, fish spotting, the movements of big game, food supply and exploration among other subjects. The lecture is written in such a form that it can be delivered as it stands, without any additions on the part of the lecturer.

The Council welcome any suggestions for lectures, either as to subject or before whom they could be delivered, whether schools, societies or other bodies. The lecture and slides are lent free to members of the Society, with the proviso that any broken slides must be replaced.

A list of the lectures to be delivered this month is given in the Forthcoming Events at the end of these notices.

Society's Slides

The Society possesses over 2,500 slides of aircraft and items of historical interest, and a complete index of these slides is now in the course of preparation. Many members have presented slides to the Society, and the Council hope that every member will continually bear the collection in mind. It is now one of the biggest slide collections on purely aeronautical subjects in the world, and from it can be provided material on practically every side of aviation. The slides have proved to form excellent propaganda and there is a steadily-increasing demand for them.

Meeting of Council

A Meeting of Council was held on Tuesday, September 20th, 1932, in the Offices of the Society.

Present:—Mr. C. R. Fairey (President), in the chair; Major T. M. Barlow, Mr. R. Blackburn, Mr. Griffith Brewer (Vice-President), Air Marshal Sir Robert Brooke-Popham (Vice-President), Major G. P. Bulman, Mr. J. E. Hodgson (Hon. Librarian), Major D. H. Kennedy (Hon. Treasurer), Mr. M. Langley, Mr. W. O. Manning, Mr. R. K. Pierson, Mr. D. R. Pye, The Master of Sempill (Past-President), Colonel F. C. Shelmerdine, Mr. A. F. Sidgreaves, Mr. H. E.

Wimperis (Vice-President), Mr. L. A. Wingfield (Hon. Solicitor), Mr. R. McKinnon Wood.

Among the business transacted was the following: The appointment of a Committee of Council to report to the Council on Ground Engineers; the report of the Finance Committee; the report of the Grading Committee; the lecture programme; the recommendations of the Medals and Awards Committee.

Awards

The following awards were made at the Council Meeting held on Tuesday, September 20th, 1932.

Silver Medal.—To Senhor Juan de la Cierva, for his work in connection with the development of the Autogiro.

Simms Gold Medal.—To Mr. P. Salmon for his paper and work on Catapults.

Wakefield Gold Medal.—To Mr. L. G. Frise, for his invention of the Frise Aileron.

R.38 Memorial Prize.—To Mr. D. H. Williams and Mr. A. R. Collar for their joint paper on "The Motion of an Airship under Certain Conditions."

Pilcher Memorial Prize.—To Mr. Dowsett, for his paper on The Design of Aeroplane Controls and Control Systems.

The Awards and Medals Committee have under further consideration for recommendation to the Council the awards of the Taylor Gold Medal and the Busk Memorial Prize.

Elections

At a meeting of Council held on September 20th, 1932, the following candidates for election to the Society were approved:—

Associate Fellows.—John Falk Arnold, Owen Wilson Clapp, John Freeman Cuss (from Student), John Dickie, Michael Andrew Doyle, John Talbot Dyment (from Associate), Robert McVie (from Student), Sures Chandra Sen, Robert Ashinhurst Bird Stone.

Associate Members.—Arthur Edward Bingham (from Assoc.), Eric Powell.

Associates.—Harry Frederick Baker (Aust. Br.), George Norman Beckmann (from Student), Norman Bull, Bernard Elliott Dunkley, Christopher Robson Elgie, Robert Haigh, Arthur Leslie Haslam, William Joseph Hickey (from Student), Basil Richard Hunter Hicks, James Carl de Hoedt, Nelson Jerram, Frederick Charles Keating, William Albert Charles Kingham, John Vanston Roberts, Edwin Shipley, Thomas Frederick Wookey.

Students.—Erach Sorabji Godivala, John Chevalier Hardman, John Reginald Henderson, Stuart MacLaurin, Khubchand Kundanmal Ramchandani, Atam Sarup, Edmund Joseph Weiss.

Companion.—Robert Rule Graham.

Lecture Dinners

The attention of all members attending the lectures of the Society is drawn to the following:—

The Royal Aero Club have arranged to serve a special late dinner following the lectures, from 9 p.m. onwards, for 2s. 6d. a head, to any members of the

Society, who will be made Honorary Members of the Royal Aero Club for the evening, and will be able to take advantage of all the usual Club amenities.

All that is necessary for any member of the Society to take advantage of this offer is to show his membership card. It is hoped that as many members of the Society as possible will take advantage of the arrangement which has been made. The Club is situated at 119, Piccadilly, and is one of the most up-to-date and comfortable clubs in London.

Acknowledgments

The Council wish gratefully to acknowledge the following: From Captain F. L. M. Boothby, a photograph signed by Lord Jellicoe and Admiral Sir Hugh Watson on board the prewar airship Hansa; slides of the Wallace, from the Westland Aircraft Works; slides of engines from the Bristol Aeroplane Company; and photographs of De Havilland aircraft from the De Havilland Aircraft Co., Ltd.

Corrections

In the review of Testing of High-Speed Internal Combustion Engines by A. W. Judge, the price should be 25/- net, and not 42/- net as stated. $COAO_2$ should read CO and O_2.

In the lecture on Mechanical Tests of Aircraft Structural Components, Fig. 9, on page 683, has been printed upside down.

Forthcoming Events

Saturday, October 1st.—Lecture before Weymouth College, by Capt. A. S. Keep, M.C., A.F.R.AeS.

Wednesday, October 5th.—Lecture before Brentwood School, by Flight-Lieut. R. E. H. Allen, M.I.Ae.E.

Wednesday, October 5th.—Lecture before Cranbrook School, by Mr. J. L. Hodgson, Comp.R.Ae.S.I.

Thursday, October 6th.—Lecture, "Air Navigation," by Capt. N. Macmillan, M.C., A.F.C., A.F.R.Ae.S., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, 6.30 p.m.

Friday, October 7th.—Lecture before King's School, Ely, by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Saturday, October 8th.—Lecture before Hurstpierpoint College, by Capt. J. Laurence Pritchard, Hon. F.R.Ae.S.

Monday, October 10th.—Lecture before the Royal Grammar School, Newcastle-on-Tyne, by Mr. John Bell, A.R.Ae.S.I.

Tuesday, October 11th.—Lecture before Hull Grammar School, by Mr. H. V. Whiting, A.R.Ae.S.I.

Friday, October 14th.—Lecture before Rutherford College, by Mr. John Bell, A.R.Ae.S.I.

Friday, October 14th.—Lecture before the Foremen's Mutual Benefit Society by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Saturday, October 15th.—Lecture before Haileybury College by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Thursday, October 20th.—Lecture, "Flying Conditions on the West Coast of Africa," by Flight-Lieut. W. G. Pudney, Royal Society of Arts, 6.30 p.m.

Thursday, October 20th.—Lecture before the Yeovil Branch by Mr. H. B. Taylor, A.F.R.Ae.S., on "Compression-Ignition Aero Engines."

Monday, October 24th.—Lecture before Felstead School, by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Wednesday, October 26th.—Lecture before Bromsgrove School, by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Thursday, October 27th.—Lecture, "Aeroplane Covers and Wheels," by Mr. F. Fellowes, F.I.R.I.; Royal Society of Arts, 6.30 p.m. (Joint Meeting with the Institution of the Rubber Industry.)

Friday, October 28th.—Lecture before Warwick School, by Mr. F. Radcliffe, B.Sc., A.R.Ae.S.I.

Saturday, October 29th.—Lecture before Stamford School by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

J. LAURENCE PRITCHARD, *Secretary*.

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

NOVEMBER, 1932

Council Meeting

A Meeting of Council was held in the Offices of the Society on Tuesday, October 18th, 1932.

Present:—Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President) in the chair; Professor L. Bairstow (Vice-President), Mr. R. Blackburn, Mr. Griffith Brewer (Vice-President), Air-Marshal Sir R. Brooke-Popham (Vice-President), Major G. P. Bulman, Mr. R. J. Capon, Mr. E. C. Gordon-England, Mr. W. S. Farren, Mr. A. H. Hall, Major D. H. Kennedy (Hon. Treasurer), Mr. M. Langley, Mr. W. O. Manning, Mr. R. K. Pierson, The Master of Sempill (Past-President), Mr. H. E. Wimperis (Vice-President), Mr. L. A. Wingfield (Hon. Solicitor).

Among the business transacted was the Report of the Finance Committee; Report of the Grading Committee; Report of the Medals and Awards Committee; the Lecture Programme for the Second Half of the Session, and a letter from the International Association for Testing Materials.

Awards

The Council at their meeting held on Tuesday, October 18th, made the following awards:—

Taylor Gold Medal.—Dr. G. V. Lachmann for his paper on "Control Beyond the Stall."

Busk Memorial Prize.—Mr. H. Constant for his paper on "Aircraft Vibration."

Elliott Memorial Prize

The Elliott Memorial Prize has been awarded to Leading Aircraft Apprentice J. M. Bushell, who obtained the highest marks in the General Studies paper of the final passing out examination of the September, 1929, entry.

Elections

At a Meeting of the Council held on Tuesday, October 18th, 1932, the following were elected members of the Society in their various grades:—

Member.—Reginald Herbert Stocken (from Associate Member).

Associate Fellows.—Harry Edwin Fozard, Phiroze Pestonji Nazir.

Associate Member.—John Gordon Hopcraft.

Associates.—Hugh Granville Loch, Geoffrey Tremayne Rodd, Harry Webb.

Students.—Rana Denis Shamsher Jung Bahadur, Ernest George Barber, Eric Debnam Baker, Robert Edmund Godefroy Brittain, Denis Osbert Bustard, Frederick George Ronald Cook, Roland Dixon, Leonard James Folkestone, Kenneth Bryan Gilmore, Eric Stanley Macartney Irdell, Robert Lang Lickley, Jacques Lorentz, Murzban Ruttonjee Mandviwalla, Victor Ronald Mumford, Walter Tye.

Companions.—Richard Humble, Eustace B. Robinson, Thomas Neville Stack.

Lecture Postponement

The lecture by Squadron-Leader H. Leedham on " The Evolution of Aircraft Wireless Equipment " has been postponed so that the information available which will be then released for the lecture will be up-to-date.

Acknowledgment of Slides

The Council had printed recently, in proof form, the index of the Society's slide collection, prepared by the Secretary. This index was sent to aircraft firms inviting them to add to the collection where they thought suitable. The Council's invitation has met with a most generous response, and they wish to acknowledge the following: From Messrs. Rolls-Royce, Ltd., 32 slides of Kestrel engines and their construction; Westland Aircraft Works, two slides of the Pterodactyl Mark IV, in addition to the many Westland slides already acknowledged; the Fairey Aviation Co., Ltd., four slides of the Fairey N.4 Atalanta Flying Boat; Armstrong-Siddeley Motors, Ltd., 11 slides of Armstrong-Siddeley aero engines; Messrs. Napiers, Ltd., 78 slides of Napier engines and their construction; Messrs. Vickers, Ltd., a number of slides of their aircraft in addition to those already acknowledged; Messrs. Short Brothers, 10 slides of Short aircraft, in addition to those already acknowledged; Messrs. Handley Page, Ltd., three slides of the Handley Page slot; the Gloster Aircraft Co., Ltd., five slides of Gloster aircraft, in addition to those already acknowledged; from Mr. W. O. Manning, two slides in addition to those already acknowledged; from Mr. W. Garrow-Fisher, nine slides; and from Mr. J. S. Irving, various engine slides.

Acknowledgment

The Council wish gratefully to acknowledge the following: From the Goodyear Tyre and Rubber Company Inc. (through J. C. Hunsaker, Esq.), photographs of the Akron, Macon and Goodyear non-rigid ships; from Captain F. L. M. Boothby, a photograph of a pre-war Zeppelin signed by Lord Jellicoe; from W. W. Falconer, an autograph letter from Mr. F. Marriott to J. A. Roebuck, M.P., on the Aerial Carriage of Henson; from Messrs. Maggs Bros., photographs of Caproni aircraft; from Wing Commander T. O'B. Hubbard, various historical books and pamphlets.

Society's Examinations

The Examinations for Associate Fellowship and Associate Membership will be held on Friday, December 30th. The hours of the examinations are 10 a.m. to 1.0 p.m., 2.30 p.m. to 5.30 p.m. The examinations will be held in the Offices of the Society.

These will be the last examinations under the old regulations, the new regulations coming into force on January 1st, 1933. Applications for taking the examinations must be received by November 11th, together with the examination fee of £2 2s.

Publications Wanted

If any member has a copy of the *Glossary of Aeronautical Terms* which he would like to sell, will he please communicate with the Secretary? And a copy of *Aerial Navigation* by Sir George Cayley.

Correction

In the article by E. W. Stedman, in the JOURNAL for October, on "An Engineer's Conception of Matter," page 861, line 17 should read,

time, and in some instances with slight heating, it hardens. Why?

Forthcoming Events

Tuesday, November 1st.—Lecture before Mostyn House School, by Flight-Lieut. N. Comper, A.F.R.Ae.S.

Tuesday, November 1st.—Lecture before Beaumont College, by Mr. H. B. Wyn-Evans, M.B.E., R.C.N.C., A.F.R.Ae.S.

Wednesday, November 2nd.—Lecture before Leighton Park School, Reading, by Major D. H. Kennedy, O.B.E., F.R.Ae.S.

Thursday, November 3rd.—Lecture before the Hull Aero Club, by Flight Lieut. N. Comper, A.F.R.Ae.S.

Thursday, November 3rd.—Lecture: "Civil Primary Training," by Major H. G. Travers, D.S.C., in the Lecture Hall of The Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Thursday, November 3rd.—Lecture before the Yeovil Branch, by Captain F. Entwistle, B.Sc., on "Meteorology."

Friday, November 4th.—Lecture before City of Oxford School by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Friday, November 4th.—Lecture before Sutton Valence School, by Mr. J. E. Hodgson, Hon. Librarian.

Saturday, November 5th.—Lecture before Bedales School, Petersfield, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Sunday, November 6th.—Lecture at Antwerp, by Captain Gillman, on British Aviation.

Monday, November 7th.—Lecture before the Boys' School, Hillingdon, by Mr. J. T. Morton, A.F.R.Ae.S.

Tuesday, November 8th.—Lecture before Ampleforth College, by Mr. Robert Blackburn, O.B.E., F.R.Ae.S., M.I.Ae.E.

Wednesday, November 9th.—Lecture before Upton College, by Mr. J. T. Morton, A.F.R.Ae.S.

Thursday, November 10th.—Lecture: "Airscrew Design," by Mr. D. Hollis-Williams, B.Sc., A.F.R.Ae.S., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

Friday, November 11th.—Lecture before Dover College, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Monday, November 14th.—Lecture before St. Olave's School, by Mr. W. O. Manning, F.R.Ae.S.

Monday, November 14th.—Lecture before the Royal Grammar School, Worcester, by Mr. F. Radcliffe, B.Sc., A.R.Ae.S.I.

Wednesday, November 16th.—Lecture before the Manchester Branch, by Mr. Yuill, on "Flying Training."

Thursday, November 17th.—Lecture before Ryde Grammar School, by Mr. T. A. S. Lloyd, Comp.R.Ae.S.I.

Thursday, November 17th.—Lecture before the Yeovil Branch, by Mr. Bainbridge of the British Oxygen Co., on "Electric Welding."

Friday, November 18th.—Lecture before King's College School, Wimbledon, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Friday, November 18th.—Lecture before the Secondary School, Houghton-le-Spring, by Mr. John Bell, A.R.Ae.S.I.

Friday, November 18th.—Lecture before King's School, Rochester, by Mr. C. P. Lipscomb, Wh.Ex., A.F.R.Ae.S.

Saturday, November 19th.—Lecture before Stowe School, by Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President).

Saturday, November 19th.—Lecture in the Leicester Museum, by Flight-Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.

Monday, November 21st.—Lecture before Bromsgrove School by Captain J. Laurence Pritchard, Hon.F.R.Ae.S. (Postponed from last month.)

Monday, November 21st.—Lecture before King's School, Canterbury, by Mr. J. E. Hodgson, Hon. Librarian.

Tuesday, November 22nd.—Inaugural Address before the Students' Section by Professor T. R. Cave-Browne-Cave, C.B.E., F.R.Ae.S., M.I.Mech.E., A.M.Inst.N.A. In the Library of the Society, at 6.30 p.m.

Tuesday, November 22nd.—Lecture before St. Paul's School, Kensington, by Mr. W. O. Manning, F.R.Ae.S.

Tuesday, November 22nd.—Lecture before Uppingham School, by Flight-Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.

Wednesday, November 23rd.—Lecture before Leeds Grammar School, by Mr. Robert Blackburn, O.B.E., F.R.Ae.S., M.I.Ae.E.

Wednesday, November 23rd.—Lecture before Alderman Newton's School, Leicester, by Flight-Lieut. Hewitt.

Thursday, November 24th.—Lecture before Harrow School, by Mr. C. R. Fairey, M.B.E., F.R.Ae.S., President.

Thursday, November 24th.—Lecture before Manchester Grammar School, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Friday, November 25th.—Lecture before Eton College, by Colonel the Master of Sempill, A.F.C., F.R.Ae.S., Past-President.

Friday, November 25th.—Lecture before Balshaw's School, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

Friday, November 25th.—Lecture before Wyggeston School, by Flight-Lieut. C. W. Hewitt, A.R.Ae.S.I., R.N.

Friday, November 25th.—Lecture before Haberdasher Aske's Hatcham School, by Mr. M. L. Bramson, A.C.G.I., F.R.Ae.S.

Saturday, November 26th.—Lecture before Dean Close School, Cheltenham, by Flight-Lieut. R. E. H. Allen, M.I.Ae.E.

Monday, November 28th.—Lecture before Cambridge and County High School, by Captain J. Laurence Pritchard, Hon.F.R.Ae.S.

J. LAURENCE PRITCHARD, *Secretary.*

THE

ROYAL AERONAUTICAL SOCIETY

With which is incorporated the Institution of Aeronautical Engineers

MONTHLY NOTICES

DECEMBER, 1932

Office Closing

The offices will be closed from Saturday, December 24th, 1932, to Tuesday, December 27th, 1932, inclusive, for the Christmas holidays. The Library will also be closed all day Friday, December 30th, 1932, and Saturday morning, December 31st, 1932, for the Associate Fellowship and Associate Membership examinations.

Postponement of Lecture

The lecture by Dr. Dornier on " Lessons of the Do. X," originally arranged for December 15th, has been postponed to the second half of the Session in order that Dr. Dornier may be able to incorporate some of the latest results of his work. The new date will be announced shortly.

Council Meeting

A Meeting of Council was held on Tuesday, November 15th, 1932, in the offices of the Society.

Present: Mr. C. R. Fairey, President, in the chair; Sir H. R. M. Brooke-Popham (Vice-President), Major T. M. Barlow, Mr. Griffith Brewer, Major G. P. Bulman, Mr. Gordon England, Mr. H. E. Hodgson (Honorary Librarian), Major D. H. Kennedy (Honorary Treasurer), Mr. M. Langley, Mr. W. O. Manning, Mr. R. K. Pierson, Mr. D. R. Pye, Mr. E. F. Relf and Mr. Lawrence Wingfield (Honorary Solicitor).

Among the business transacted was the following:—Approval of a draft letter to the University of London; further additions to the Lecture Programme; the recommendations for the Guggenheim Gold Medal; the report of the Finance Committee; the report of the Grading Committee; the Syllabus of the Examinations.

Informal Dinner and Discussion

The Guild of Air Pilots and Air Navigators of the British Empire have arranged to hold an informal dinner and discussion on Monday, December 12th, 1932. The dinner will be held in Williamson's Restaurant, Bow Lane, E.C.2, at 8 p.m., and Wing Commander Treadgold, R.A.F.O., will open a discussion upon the subject of " Physical Efficiency as it Applies to the B Licence Pilot." The dinner will be à la carte and any members of the Society will be welcome. Morning dress will be worn.

Index of Slides

An index of the 3,000 slides in the Society's slide collection has been published (price 1/-; 1/3 post paid).

The slide collection is one of the most representative in the world, but the Council are well aware that there are many gaps in it which urgently require filling, and they appeal to all who have slides to help to fill these gaps and make the collection fully representative. The Council hope that all who have slides will look upon the Society as a national repository for them, where they will be preserved and available at all times.

There is a considerable demand for these slides for lecture purposes and they are loaned to members free of charge under the following conditions:—

(1) Registered postage is paid both ways.
(2) Broken slides are replaced, whether cracked in the post or in use.
(3) The slides are returned immediately following delivery of the lecture.

Library

Members are reminded of the hours of opening of the Library, as follows:—

Monday-Friday: 9.30 a.m.-5 p.m., except periodical Wednesdays, when it is open only from 9.30 a.m. to 1 p.m.

Saturday: 9.30 a.m.-12.30 p.m.; 2.30 p.m.-5.30 p.m. (See also special notice in first paragraph.)

All members of the Society may borrow books or have them sent by post on payment of postage both ways. Books may be retained for three weeks except in the case of the technical books most in demand, when a week only may be the limit of borrowing.

Forthcoming Events

Thursday, December 1st.—Lecture, "The Behaviour of Fluids in Turbulent Motion," by Mr. A. Fage, A.R.C.Sc. F.R.Ae.S., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, 6.30 p.m.

Thursday, December 1st.—Lecture before the Yeovil Branch by Mr. D. L. Hollis-Williams, B.Sc., A.F.R.Ae.S., on "Airscrew Development."

Thursday, December 1st.—Lecture before Imperial Service College by Mr. H. B. Wyn-Evans, M.B.E., R.C.N.C., A.F.R.Ae.S.

Friday, December 2nd.—Lecture before Merchant Taylors' School by Mr. C. R. Fairey, M.B.E., F.R.Ae.S. (President).

Saturday, December 3rd.—Lecture before Dean Close School, Cheltenham, by Flight Lieut. R. E. H. Allen, M.I.Ae.E., R.A.F. (Postponed from last month.)

Saturday, December 3rd.—Lecture before Leys School, Cambridge, by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Monday, December 5th.—Lecture before King Edward VIth School, Southampton, by Professor T. R. Cave-Browne-Cave, C.B.E., F.R.Ae.S.

Monday, December 5th.—Lecture before Newcastle-under-Lyme High School by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Thursday, December 8th.—Lecture, "Air Survey," by Lieut. J. S. A. Salt, R.E., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, 6.30 p.m.

Thursday, December 8th.—Lecture before Peter Symonds' School, Winchester, by Professor T. R. Cave-Browne-Cave, C.B.E., F.R.Ae.S.

Friday, December 9th.—Lecture before Framlingham College by Mr. S. Scott-Hall, M.Sc., D.I.C., A.F.R.Ae.S.

Friday, December 9th.—Lecture before City of London Freemen's School by Mr. N. A. C. Champion, A.M.I.Ae.E.

Saturday, December 10th.—Lecture before Caterham School by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Saturday, December 10th.—Visit by the Students' Section to the Works of the H. G. Hawker Engineering Co., Ltd., Kingston-on-Thames, at 3 p.m.

Monday, December 12th.—Lecture before the Manchester Branch by Capt. J. Laurence Pritchard.

Thursday, December 15th.—Lecture before the Yeovil Branch by Lieut. R. R. Graham, Comp.R.Ae.S.I., R.N., on "Some Secrets of Bird Flight."

Friday, December 16th.—Lecture before Northampton Town and County School by Capt. J. Laurence Pritchard, Hon.F.R.Ae.S.

Friday, December 16th.—Lecture before Toc H, St. Austell Group, by Flt.-Lt. P. Phillips, D.F.C., Comp.R.Ae.S.I.

Tuesday, December 20th.—Lecture before the Gloucester and Cheltenham Branch by Mr. H. L. Stevens, B.A., F.R.Ae.S., on "Flying Controls."

J. LAURENCE PRITCHARD, *Secretary*.

ROLLS-ROYCE

Aero Engines

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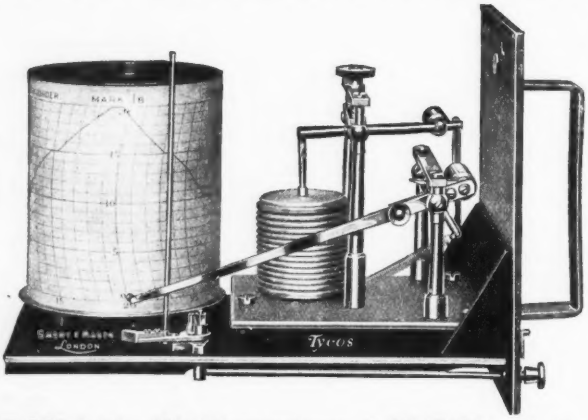

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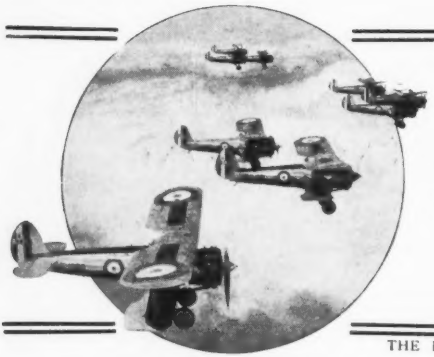

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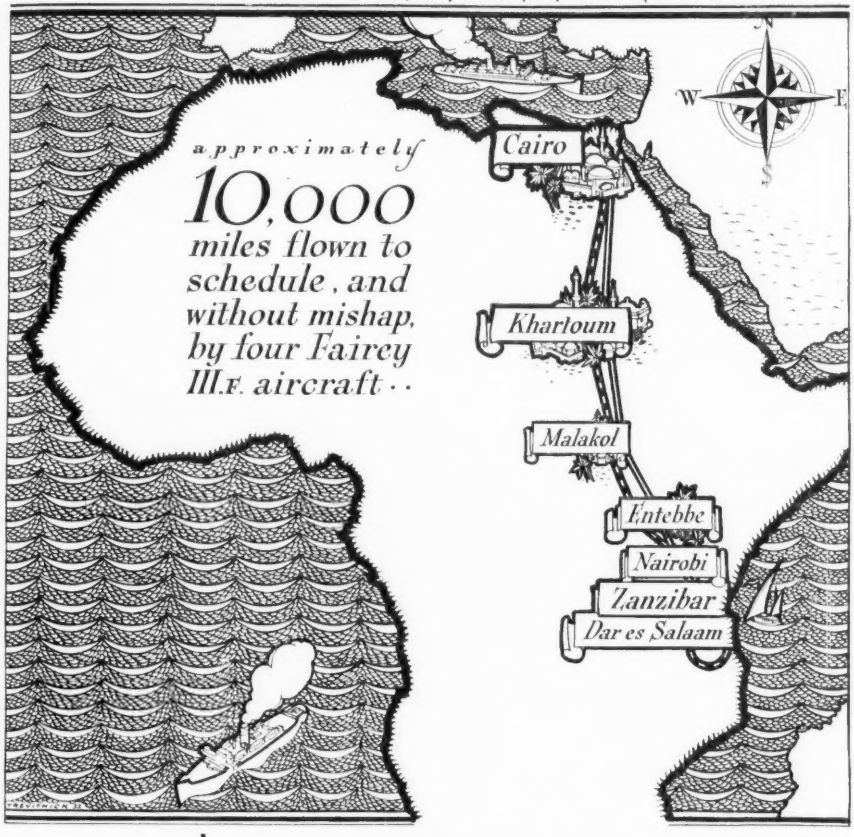

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